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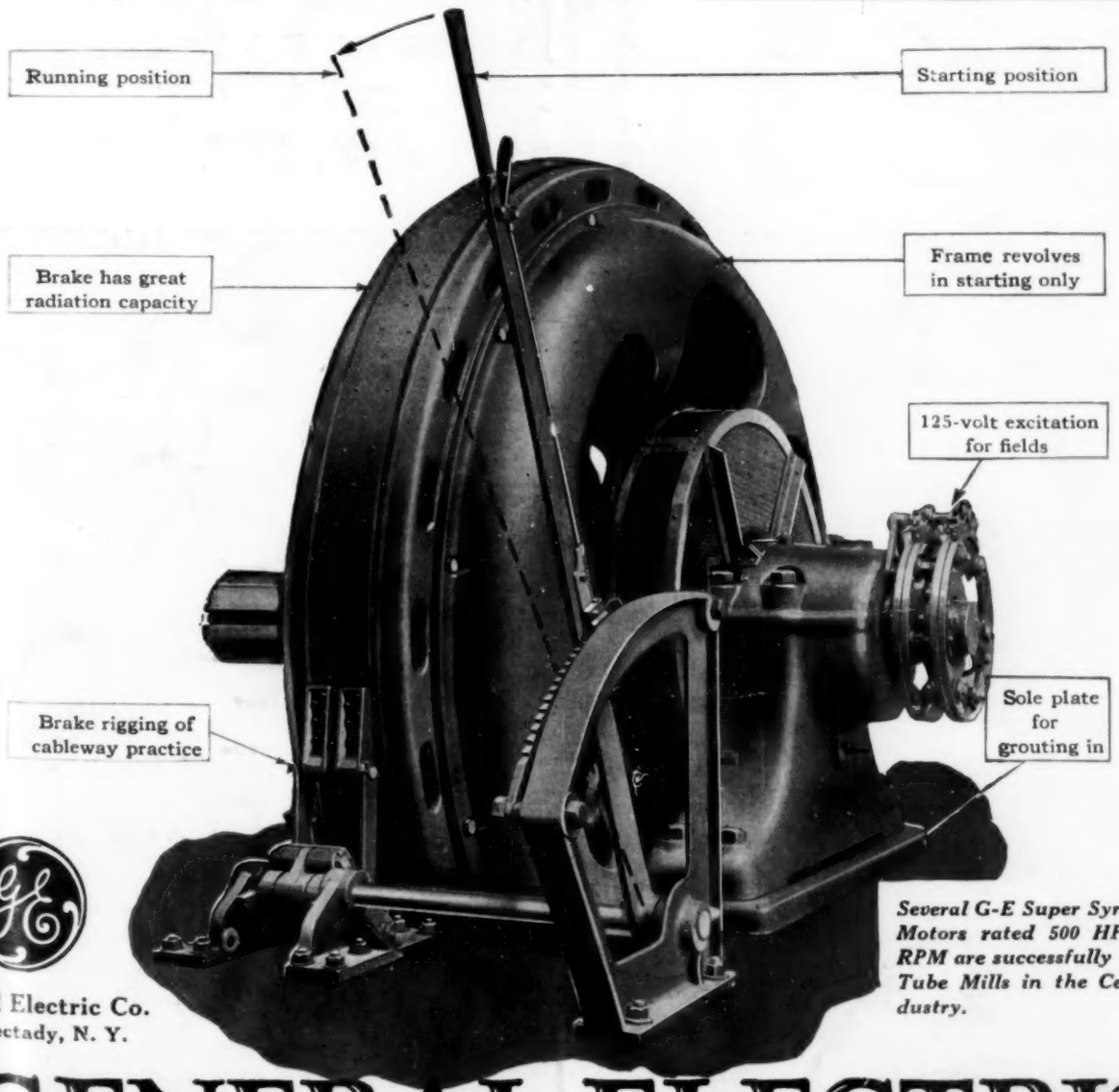
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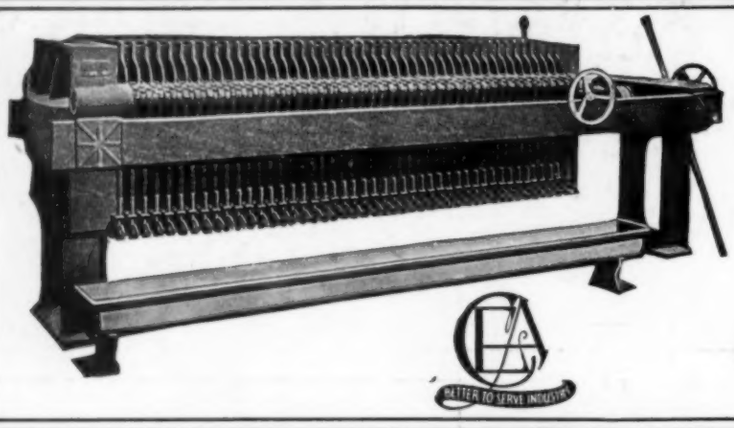

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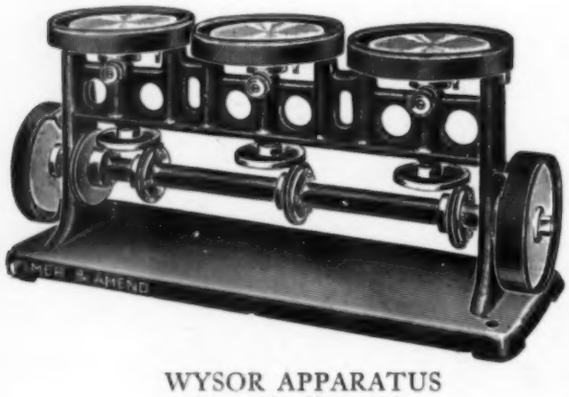

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H. C. PARMELEE, Editor

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A Pudding of Opinion on Chemical Industry

WHAT is the outlook for chemical industry in the United States? Here are some opinions gathered from several gentlemen who occupy posts of High Observation, mixed with a few notions of our own. We offer the whole as a Pudding of Opinion.

In quantity the American output compares favorably with that of Germany in 1914. In quality some domestic products have always been of the best. Other wares have had to pass through the ordeal of hostile and lively criticism, and, having done so, they have been so markedly improved as to reach the highest standards. This is offered as evidence that chemical industry is at home in the United States.

Owing to our pre-war inertia in respect to chemical development there is today a shortage of real chemical skill available: we mean specific chemical expertness, among professional men and artisans. We have many chemists but a limited number of supreme men in particular industrial fields, and many workers, but a limited number of skilled workmen. In this respect the Germans are, doubtless, better off than we are. But Americans have shown a remarkable aptitude for achieving this very skill, and modern experience teaches us that chemical industry appeals to Americans. Therefore it is fair to believe that within a few years the number of extraordinary men, competent for world leadership in the various branches of chemical industry, will be sufficient to meet requirements for the purpose.

In the meantime German industries have to wrestle with their country's handicap of a broken financial structure. Financial stability requires years to establish; there is no short cut to the achievement of it. The recovery of German leadership in industrial chemistry is still in the offing for this reason irrespective of others.

A hazard that has been touched upon is the possibility of close working agreements between German and French manufacturers. We should be more disposed to consider such relationship between German and various other European manufacturers. Wherever the labor cost is a predominant factor it might threaten American world markets. In the meantime we understand that the disposition of German industrialists is to insist upon control of all foreign establishments as elicit their participation. The French dye industry is under German surveillance, and there may be chemical establishments in Great Britain and in this country of which a majority of the shares have been taken over for German account. We have heard rumors to this effect, but no confirmation of them.

In regard to chemical industries in which the labor factor is inconsiderable we see no cause for concern, provided always the managers of American organizations know enough to keep ahead of the game in research. American financial control is still addicted to lopping off the expense of research as soon as sales decrease, and this is a fatal error. It is indeed the source of our greatest danger. Otherwise the outlook is rosy, and the great demand for the development of power in the Appalachian regions, especially in connection with electrochemical enterprises, is evidence that this is recognized.

The habit of furnishing service with sales along with quality products has been adopted by a large enough number of important American manufacturers to begin to show results even in the export field. In China, for instance, certain American-made chemical products have held their own against German offerings at lower prices. This is attributed to quality and sales services.

On the whole it is fair to say that chemical industry in the United States has a good start, that it is holding its own, and that Americans take to it. Experience is growing apace, in the laboratory and in the works. The hard question to answer is, How much chemical wisdom and sense is developing in the Directors' room?

Evidences of Real Prosperity

PROSPERITY is such an intangible and ephemeral sort of condition that sometimes it is with us before we know it—and again it is gone while we are still celebrating its arrival. Industrial peaks and crises are nearly always viewed in retrospect and the difficulty lies in translating them into terms of present conditions. To say, therefore, that the American wage earner is now in a more prosperous condition than ever before in his history is so contrary to common belief as to call for both explanation and study.

This, however, is the conclusion drawn from the National Industrial Conference Board's intensive research into the economics of wages and the cost of living. It is reported that during the past year earnings have risen so much more than living expenses that 1920 need no longer be considered the high-water mark for the worker in American industry. The Board studied conditions in plants employing more than 600,000 workers, and based its conclusions on their "real" earnings, that is, the excess of wages over the cost of living. In May, 1923, this important margin was greater by one sixth than in June, 1920. With July, 1914, as 100, the weighted index of hourly earn-

ings in June, 1920, was 248 and of weekly earnings was 240, while that for the cost of living was 203. Comparing these margins with that of the pre-war month gave an index number for real hourly earnings of 122 and for real weekly earnings of 118. Subsequently as the cost of living fell off more rapidly than earnings, this index proceeded to rise, reaching a high point of 133 for real hourly and 120 for real weekly earnings in September and October, 1920.

With the wave of increased production that started during the middle of 1922, earnings again arose and we find the Board's index numbers showing steady gains. By May, 1923, wages were fast returning to the peak levels of 1920, while the cost of living, although rising, was still considerably below the former peaks. As a result the index of real hourly earnings mounted to 139 and real weekly earnings followed closely behind with 136—or between 17 and 18 per cent greater than the figures for June, 1920.

Here then is the concrete evidence of a prosperity that has a real meaning to the country. The improvement thus recorded in the status of the individual worker means a higher purchasing power for his wages and a widened market for the products of industry.

A More Favorable Outlook For Vegetable Oil Consumers

INDUSTRIES that consume vegetable oils—and there are but few in the chemical engineering field that do not have some contact with the oil producer and refiner —are welcoming with open arms the bearish forecasts that have recently forced down prices so sharply. Things have gone hard with these consuming industries during the "crop year" just drawing to a close and naturally they are pleased with the favorable change of outlook. The situation in the case of the two basic oils—cottonseed and linseed—may perhaps be regarded as typical.

High prices for cottonseed oil products prevailed during the greater part of the crop year that is now passing. Export business slumped tremendously for with the short crop there was really no great surplus to offer abroad. The tariff proved quite effective in holding down the competition of imported oils from the Orient and there can be no doubt that at the same time it aided materially in sustaining the abnormally high prices. In contrast to this situation we now find new crop cottonseed oil available at a discount of almost a cent and a half from the immediate shipment prices. It is evident that the traders are anticipating a substantial increase in production. In this connection it may be recalled that in 1922 our production of cotton barely reached 10,000,000 bales while estimates on this year's crop vary from 11,500,000 to 12,000,000 bales. Barring an unfavorable turn in weather conditions during the remainder of the growing season, it is safe to predict that at least a half million barrels more of cottonseed oil will be available to consuming industries this year than was the case in 1922.

Linseed oil prices are governed by two factors—the world's production of flaxseed and the world's consumption of the oil. During the first half of this year a demand for linseed oil in the United States that upset all calculations, together with a subnormal seed production, particularly in this country, brought about a period of unusually high prices. The paint and linoleum industries reflecting the building boom operated at capacity and strange to say the high oil prices apparently did not interfere with their business.

The agitation in the Northwest for increased flaxseed acreage has apparently borne some fruit. The crop according to latest official reports is estimated at 18,000,000 bushels compared with a little more than 12,000,000 a year ago. Even this, however, is far short of the gain prophesied by those who succeeded in enacting the 40c. per bushel protective duty on flaxseed. It will be necessary for this country to import heavily during the coming year since our needs will approximate 36,000,000 bushels even allowing for a moderate recession in business.

The factor that really encourages the linseed oil consumer, however, is the change in the Argentine outlook. Not so long ago the estimates of that country's exportable surplus of flaxseed were sharply reduced and the crushers apprehended a shortage should oil consumption continue at the pace set earlier in the year. Now comes the news that the Argentine crop was larger than expected and, since the demand for oil met with a temporary setback, the crushers have been able to catch up with their business. Thus it is reasonable to suppose that the linseed, as well as the cottonseed, industry will enter upon the new crop year with a better footing and more favorable prospects than was the case a year ago.

Steady Jobs for P. & G. Employees

CONTINUOUS, as contrasted with seasonal, employment is a goal striven for by all of our industries. To attain it means uninterrupted production and a steady flow of effort that minimizes overhead and the expenses of planning. But it is not management alone that profits from the year-around job. The feeling of security against the menace of unemployment—whether from lay-off, shut-down or seasonal depression—makes for satisfied employees. It helps to heal over the breach between office and plant. If the man who works with his hands knows that he is just as sure of his job as the higher-ups and the white-collared boys in the office, he is less inclined to complain about the longer hours and the occasional night shift.

Actually, of course, lower guaranteed wages are often more than equivalent to the bigger returns of intermittent employment. The workman's standard of living is determined not so much by his weekly pay envelop as by his yearly income. It is this, together with the demands of the unions that accounts for the ridiculously high daily wages of the brick layer or coal miner. And it is this situation that to a lesser extent is responsible for the ups and downs of wages in the iron and steel and many other industries.

Both the management and the men will, therefore, recognize as a significant development the announcement made last week by the officials of Procter & Gamble. Beginning Aug. 1, all of the thousands of employees of the P. & G. plants and offices are guaranteed full-time employment for not less than 48 weeks in any year regardless of seasonal depression in the industry. This company, which was one of the first in this country to endorse the sharing of profits with its employees, has thus set a still higher standard of industrial relations that is worthy of emulation by many other of our industries.

Sense and Nonsense Regarding Gas Poisoning

POISONING from manufactured gas has been the occasion of much controversy and some serious investigation; but many, even technical men who should be well informed in the matter, seem frequently to have missed the essential points involved. For some reason they lose sight of the fact that it is not the carbon monoxide in the gas, but the carbon monoxide formed from its improper combustion, that is almost invariably the cause of serious consequences in preventable accidents.

When water-gas was first made, there was a great deal of anxiety lest the higher carbon monoxide content of the gas would be the occasion of a greatly increased number of poisoning cases. But experience with water-gas soon showed that there was little, if any, more danger with 30 per cent carbon monoxide in carburetted water-gas than with 8 or 10 per cent carbon monoxide mixtures in coal gas. In the gas plants and in trench work on distribution systems, somewhat greater care had to be exercised by the gas company employees themselves; but on the customer's premises there is little to choose between the two. Cases where accidental exposure to sufficient concentrations for serious results with the one gas would almost always result in equally serious consequences with the other.

Repeatedly during the past 25 years there have been efforts to control the percentage of carbon monoxide in city gas supplies by legislative enactment, by municipal ordinance, or by rules of health officers, utility commissions or other public agencies. Fortunately practically every such effort has been met with a frank, clear explanation of facts, so that there has been no handicap placed upon the industry in its development of whichever gas was most economical to make. But just now there seems to be a tendency to renew legislative efforts of this sort. Perhaps this is the result of the substitution of manufactured gas for natural gas quite as much as any other single factor. In any event, technical men called upon for assistance in settling such problems should be very sure of their facts before allowing their general impression as to the danger of carbon monoxide to lead them to false conclusions.

Any hydrocarbon gas mixture when burned in a Bunsen type burner makes carbon monoxide in large quantity as the *primary* product of combustion. However, with properly designed and adjusted appliances all of this carbon monoxide is completely oxidized to carbon dioxide before the products of combustion leave the zone of the outer flame. Thus there is no carbon monoxide discharged from the appliance, except in the case of some high-efficiency high-capacity water heaters, which even on proper adjustment occasionally produce small quantities of carbon monoxide in the flue products. But all such appliances which do make carbon monoxide are connected to a flue. Thus there is no more danger from the carbon monoxide in the products from these appliances than there is from furnace gas from the ordinary house-heating equipment burning solid fuel.

However, an improperly designed or dirty and poorly adjusted cook stove burner may "fire back" and allow the gas to burn inside the mixing chamber of the burner. Then this burner is very likely to become a splendid carbon monoxide generator, delivering its dangerous products of combustion directly into the kitchen. Similarly other appliances can be equally culpable if cheap and poorly designed, but it is the appliance and not the gas that is at fault.

Gas engineers generally understand these facts; but not uncommonly chemical engineers who have little regular acquaintance with the gas business are called upon as experts in gas poisoning cases or in connection with the consideration of proposed rules or legislation. It will be well for such "experts" to make sure of their qualifications. The chemistry and the physics of gas combustion in Bunsen-type burners is well understood. They can get the necessary facts to guide them from the Bureau of Standards, the Bureau of Mines or from many other impartial and reliable sources of information. They should take care to study these facts thoroughly before venturing to give expert testimony. Otherwise off-hand conclusions may be drawn that are likely to be somewhat in error.

Too Many Exceptions Make a Rule Useless

LAWS generally have to be amended before they can be enforced with even moderate success. Even so, some amendments may work against success rather than for it; and sometimes an amendment will so weaken a law that it becomes almost inoperative. We have in mind the most recent amendment to the New York State licensing law for engineers.

According to this amendment those who practice professional engineering solely as officers or employees of a corporation engaged in interstate commerce are exempt from the provisions of the law. This adds greatly to the already long list of those who are exempt in New York State, and unfortunately other states are inclined to follow this lead.

This seems of importance because if this tendency continues to hold, soon only those engineers with independent consulting practices will be required to obtain licenses. While such an end might be welcome to some corporations, it would result in laws based on a principle diametrically opposed to that upon which the original laws stood. Instead of the law existing for the protection of the life, health and property of the public, such a result causes it to become merely an instrument for protecting established consultants from the competition of younger and less experienced engineers. This seems subversive of professional ethics. It is time to stop the extension of this exemption mania, or else to repeal the laws and begin all over again from some new point of departure.

We have received an advertisement of a widely advertised shaving cream headed "A Triumph of Engineering Chemistry." We wonder. The stuff is, to the user at least, the same as an English preparation that has been on the market for over 50 years. We believe it is made principally of cold cream and glycerine, with some dissolved wax and perfumery. Where the engineering chemistry comes in is what beats us—unless under the rush of chauffeurs, machinists, locomotive and stationary enginemen to become engineers, we are asked to welcome barbers also into the profession. Why not facial engineers—and surveyors?

Farm Bloc Policies and the Engineer

A Remarkable Report by the American Farm Bureau Federation Deserves the Careful and Critical Attention of Every Engineer

Farm Bloc Ideals and the Economic Justification for Its Legislative Achievement in the 67th Congress

A STIRRING document is this annual report on the legislative activities of the American Farm Bureau Federation by Gray Silver. So it must be judged by anyone, be he capitalist or engineer, publicist or farmer. It is many things in one. It is a creed of the organized farmer and of his powerful legislative representative, the Farm Bloc. It is a justification of the much criticised legislative program that was carried out by the Farm Bloc during the sessions of the 67th Congress. It is unintentionally a challenge to the nation to acknowledge the idealism and the economic foresight that lies back of this movement.

The three objects of the Federation are cited as three ways in which federal laws could contribute to the equitable exchange of products between agriculture and other industries.

First—Legislation that would help the farmer to be a free seller on even terms with the buyer through agencies of his own creation or choice.

Second — Regulatory legislation that would curb unfair practices in manufacture and trade which have operated to the disadvantage of the farmer as well as the general public.

Third — Legislation that would tend to reduce the farmers' cost of production, processing, standardizing, and distributing.

Without the first object, the others would be sterile and ineffective, so the primary energy of the Federation was turned to this end. This has been largely accomplished, partly by the Capper-Volstead act which permits co-operative marketing and partly by the creation of the Federal Loan Board and the Federal Land Banks by which the farmer may obtain adequate credit.

Perhaps the summary at the end of the report puts this most clearly.

First: We have achieved the authorization of co-operative marketing, which gives us the strength of massed millions and arms us for the contests of the markets with the same modern methods that our buyers use.

Second: We have brought about the financial emancipation of the farmer and equipped him with one of the greatest banking institutions in the world through the general rural credit law. The American farmer now stands on a level with all other business men in his credit facilities. He has his own credit bank adapted to his peculiar needs and it serves him as other business men are served by their banks—according to their business turnover or maturities.

Third: We have secured the enactment of several laws of the greatest value in defending farmers and the general public from inimical practices and selfish exploitations.

Fourth: We have made a start in the direction of legislation affecting the lowering of farm costs in what we buy. But that is a field that remains largely with the future.

It is not too much to say that we have accomplished an industrial revolution of supreme importance not only to farmers but to the entire nation.

We are perhaps too near this historic scene to fully appreciate what it means.

> "A PATRIOTIC ENTERPRISE"
>
> "I LIKE to think of the work of the Farm Bureau Federation as a national undertaking—as a national blessing. I honestly believe that by giving agriculture new hope and new vigor we are regenerating the Republic. Our work restores the fair trade balance between the country and city and they prosper together. But most important, perhaps, from a national point of view is the putting of agriculture on firm business foundations and improving the standards of farm life and thereby insuring the perpetuity of a strong and happy rural population in America. The country will forever feed the city; and the sort of people the country sends to the city determines the kind of a city life we are to have. So, in reviving and invigorating American farm life, we are regenerating and preserving the Nation. Therefore, our watchword should be organization and service."

The Vital Necessity of Cheap Power for the Farmer and the Farm Bloc Plans for Its Realization

Nevertheless, we must not forget that the battle is only half won. We now have liberty of marketing and the machinery for its realization in the right to co-operate and in the rural credit banking organization. Yet neither of these deals fundamentally with the problem of farm costs, though both have an ameliorative effect on it. And we have not yet secured all of the needed regulatory legislation that will police our rights. Without faltering or idling or pausing to rest on our laurels we must strike while the iron is hot and go on to the reduction of agricultural cost factors.

Cheap power is of tremendous interest to farmers in more ways than are apparent at present. Perhaps the most important meaning of cheap power on the farm at present is cheap fertilizer. We are coming into an age when artificial fertilizer must be universally used if the production and value of our farms are to be maintained. We can no longer go on abandoning fifty or sixty thousand farms a year because of their loss of soil fertility. As a matter of fact, the rapid development and westward swing of population in this country has been largely due to the seeking of fertility in new lands instead of replacing it in old. Now, however, we have used up nature's store of fertility in new acres of virgin land. We cannot move on any further and we must replace what we take from the soil.

We are spending more than $300,000,000 annually for so-called fertilizers that contain an overwhelming proportion of inert material. Yet we are using only enough fertilizer at the present time to stimulate the release of the latent fertility of the soil instead of making up for depletion or adding to the stock. Fertilizer is too costly. At the present ratio of prices of fertilizer and farm products the latter cannot buy the plant food they consume.

We must look for the solution of this pressing problem in the fixation of nitrogen from the air and in the cheap production of other fertilizing elements by the use of the electric furnace.

Not only does cheap power mean cheaper products for all people, but it means cheap power on the farm for the manufacturing of farm products. The mechanical application of power in modern civilization puts mechanical genii to work for us. Today there are thirty such helpers working for the average American, but the farmer is far from having his share of them. There is no labor so cheap as the man of iron.

It is hardly possible here even to sketch the results that may be expected from the development of electrochemistry. Electric furnaces, the handmaidens of chemistry, operated by cheap water power current will give us new steel producing centers. Cheap copper — such an important consideration in deterioration of farm buildings — will come, with cheaper alloys of copper, zinc, and other metals for machinery and other purposes.

And the age that follows is undoubtedly to be the age of chemistry. It is important that every possible provision be made for the equitable distribution of the benefits of the advance in chemical engineering.

The development of cheap electric power on a huge scale portends the electrification of the railways, which indeed is one of the inevitable solutions by which the present baffling problem of railway congestion, excessive transportation costs, and inefficiency is to be overcome. Electricity means more efficient service —and more economical. That spells cheaper transportation rates.

One of the present and pressing forms in which the work of reducing the farm cost factor presents itself is in the proper development and utilization of Muscle Shoals and other great potential water powers.

The Muscle Shoals project is to be the test case, so to speak, of our ability to get rid of the crushing interest charge which is the chief part of water power cost and a large factor in the cost of all the products of mechanically applied power.

We are told on the highest technical authority that in the case of a certain so-called "cheap electric power production," which costs $24.42 annually, no less than $18.90 goes to pay for interest on the investment. That is, about 80 per cent of the cost of generating hydro-electric power goes now and, under the present system, tends to go on forever, to pay interest on the first cost of the plants. The new way means that we will eventually get power for $5 or $6 per horsepower per year instead of $25 or $30, that interest will not run on forever, and that during the pay-off period interest will be 4 per cent instead of 8 per cent, which represents the difference between public and private credits.

Significance of Muscle Shoals

Muscle Shoals is only a step—the first step—in the solution of the great power problems, but it is supremely important because if we succeed in our advocacy of the Ford tender we shall have established a ruling precedent for the future utilization of water power development on the plan of paying off and then charging off forever the original improvement costs with no chance of their continuation through melon-cutting stock dividends, improvements, bonds, etc.

If we succeed, the established power plants will have to come to the same plan of reducing charges as capital is repaid Thus it is not too much to hope that we may solve the entire problem of the future in respect to excessive power costs for all the people.

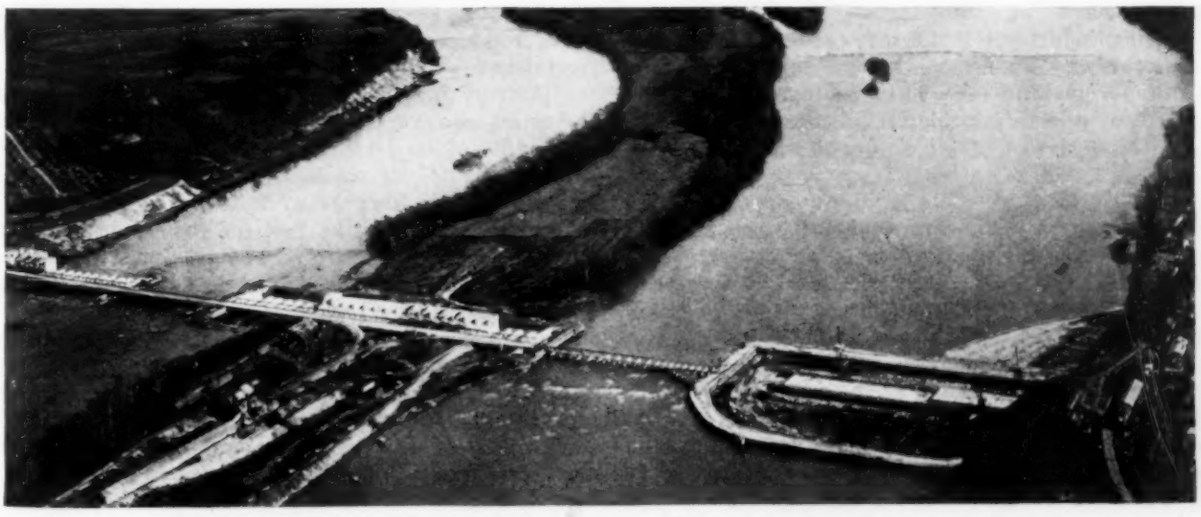
The Unfortunate Fallacy

The suggested plan cannot help but be enthusiastically considered but there are some cold hard uncompromising engineering facts that must be visualized at the same time. In the first place while the general contention of the report is correct, namely that interest charges are the greatest item in power costs; they together with taxes do not amount to over 70 per cent of the total. That would alter considerably the magnitude of the possible saving.

More important is the fact that municipal and government construction costs vastly more than a similar privately controlled enterprise. In other words a five million dollar investment by private investors would require considerably more government capital to duplicate. That is cold hard engineering fact No. 2. This means that 4 per cent interest on a government project would be considerably greater than half of the 8 per cent interest on an identical private enterprise.

And reason No. 3—the operating costs and maintenance charges are much larger in even a municipal enterprise than in a private one.

The outcome will be interesting. Doubtless if the Farm Bloc is set upon experimenting with Muscle Shoals it will be done but that the results will be disappointing seems to be a foregone conclusion if we are to judge by its own roseate estimate. The Farm Bloc is to be commended for its statesmanship, its political sagacity and its courage. As engineers we must reckon with it and give it our thoughtful criticism. The progress of the next decade both in legislative and engineering development may find its principal source in this new and vigorous political organization.



MUSCLE SHOALS, THE FIRST OBJECTIVE IN THE PROGRAM OF THE FARM BLOC

An Interesting Byproduct

California Olive Oil

From Fruit Unsuitable for Pickling, About 200,000 Gal. of Olive Oil Is Produced Annually by Methods of Crushing, Grinding and Refining Discussed in This Article

By W. V. Cruess
Fruit Products Laboratory, University of California

OLIVE OIL is a staple food in the Mediterranean countries and is used there in preference to all other edible oils. Natives of such countries who live in the United States, and many of their immediate descendants, demand olive oil; they are not content with cottonseed, corn or peanut oils. The average native-born American, on the other hand, has become accustomed to the byproduct oils (cottonseed and corn), and prefers them to olive oil because of their bland and neutral flavor, in contrast to the pronounced flavor of olive oil. Because of these conditions and because of the cheapness of the byproduct oils, the United States consumes a much greater volume of cottonseed and corn oils than of olive oil. Nevertheless, from 3,000,000 to 6,000,000 gal. of olive oil is imported per normal year. In addition, California produces about 200,000 gal. of oil per annum.

Because of cheap labor and low cost of growing the fruit, European olive oil can be produced and sold in the United States, duty paid, at a price that would make olive growing in California highly unprofitable. The industry can exist in California only as a byproduct of the olive-pickling industry. Fruit that is too small or too ripe, or otherwise unsuitable for pickling, is used in California for making oil. The pickling varieties are considered to be less desirable for oil manufacture than some of the varieties of olives grown in Europe for oil.

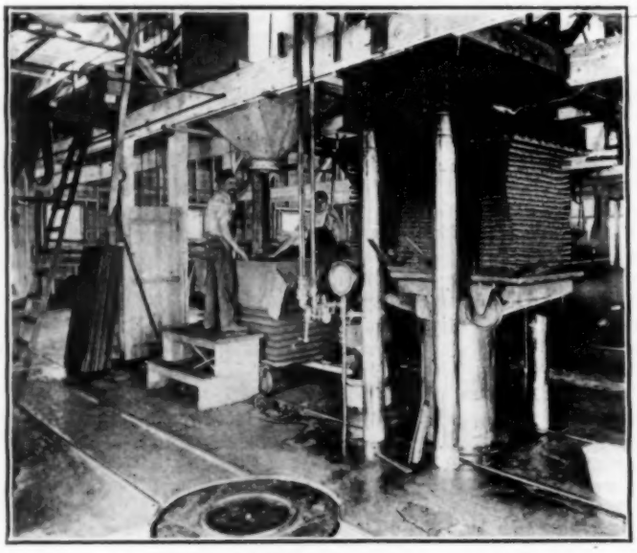


FIG. 1—PRESSING OLIVES IN A CALIFORNIA FACTORY

Olives from which the oil is to be expressed need not be harvested with the care necessary when pickling is the objective. Slight bruising is not very detrimental. They may, if desired, be knocked from the trees with poles, if care is taken to avoid injury to fruiting wood. Usually the olives are gathered by hand from the tree and transferred in buckets to 40 or 50-lb. "lug" boxes for transportation to the mill.

It frequently becomes necessary to store the fruit for a week or more before crushing. Minimum detriment to the quality of the oil results if it is stored in brine containing 5 to 10 per cent of common salt. This method is generally followed; but in some factories the olives are heaped in bins in piles 4 to 6 ft. deep. Fermentation, by bacteria that form thermophilic lactic acid, occurs in the bins; juice exudes from the olives and they acquire a "sweet" ensilage odor and flavor, both of which persist in the oil that is expressed from the fruit. Olives are also sometimes dried on trays in the sun or in an evaporator, in order to preserve them; or they are stored in shallow layers on wooden trays stacked to permit thorough ventilation. The formation of mold is thus avoided. In European countries storage in bins or piles is the usual procedure. Any disagreeable odors and flavors are removed later by refining.

The fruit may be screened, to remove twigs and leaves, when this is necessary. Leaves, if allowed to remain, are apt to impart a green color (chlorophyll) and a harsh flavor to the oil. Washing is usually unnecessary.

Experiments made in one factory indicate that much of the usual washing and refining of olive oil can be avoided if the olives are treated before crushing with a dilute lye solution (1 to 2 per cent), to remove bitterness. The treatment consists in storing the olives in the solution until it has penetrated to the pits, and subsequent washing in water to remove the lye. About one week is required for the combined treatments.

The fruit is conveyed by bucket-and-chain or slat-and-chain conveyor to an overhead crusher, which consists of fluted steel rolls revolving toward one another; it is similar to the machine used for producing rolled barley. The distance between the rolls is adjustable; they are set so that the flesh of the fruit is crushed, but most of the pits are left intact. The olives used average less than $\frac{3}{8}$ in. in diameter.

From the hopper under the crusher, the crushed olives are placed in heavy, coarse-weave cloths, which are folded to envelop completely each layer of crushed fruit, the individual cloths being separated by wooden or steel strap racks. (See Fig. 1.) The "cheese"—the stack of racks and cloths—is built up on a truck and transferred to the ram of the press.

Hydraulic pressure is usually applied, although presses operated by heavy gears are also used. The first pressing is at 300 to 500 lb. per sq.in., which

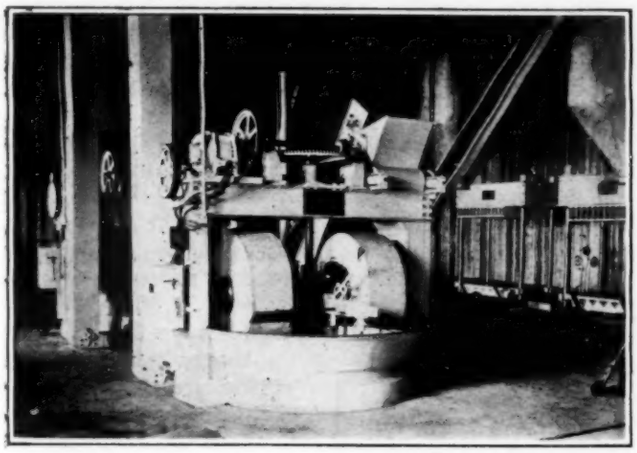


FIG. 2—EDGE RUNNER USED FOR GRINDING PRESS CAKE

removes the water of vegetation and a small amount of oil. The oil so obtained is of the highest quality and is sometimes termed virgin oil. The press racks are usually about 42 to 48 in. square.

The press cake from the first pressing is shoveled into an edge runner (Fig. 2), where it is thoroughly ground beneath heavy revolving steel or granite wheels. Some of the seeds are crushed, although this is not desirable. The second pressing is conducted at a higher pressure than the first, usually in a press with cloths and racks smaller than those in the first press. Most of the oil is obtained in this pressing. It is of good quality and is usually combined with that resulting from the first pressing.

The press cake is again ground in the edge runner and is mixed with a small proportion, probably less than 10 per cent, of hot water. The third pressing is made in the same manner as the other pressings. The product is high in margarine, solid fats, and of poor flavor.

The oil so obtained is associated with about two to three times its volume of dark-colored juice. Separation is accomplished by settling for several hours in tanks with sloping or conical bottoms and by drawing off the juice to the oil level. Continuous separators are also used.

The oil at this stage is cloudy and intensely bitter. The bitter principle, oleuropein, is soluble in water and is readily and completely removed by washing with water sprays or by spraying the oil into the bottom of a tank of water. The usual washer consists of a tall cylindrical tin-lined tank partly filled with oil. Water from a rose nozzle is sprayed on the surface and is drawn from the bottom of the tank.

The washed oil is cloudy because of the presence of occluded water and small particles of olive tissue. These must be removed in order to avoid bacterial decomposition and rancidification. Filtration breaks the oil-water emulsion and removes the solid organic matter. A convenient means of filtration is through canvas bags plastered on the inside with a layer of Filter-Cel and oil. Filter presses are also used successfully.

New oil, like new wine, is harsh and unpalatable. It must be aged for several months before bottling or canning. Tin-lined or galvanized-iron tanks, holding about 500 gal., are used. Attempt is made to maintain the storage cellar at a cool temperature—60 deg. F., or lower. Aging is hastened, but danger of rancidification is increased if higher temperatures (90 to 100 deg.) are permitted.

In California the aged oil is laboriously filtered through French filter paper in tin funnels, or through paper disks in a filter press. Undoubtedly, modern oil filter presses could be used to advantage.

According to F. T. Bioletti, a process of pitting, crushing the pitted fruit and separating the oil and finely ground pulp by the application of a vacuum, known as the Acapulco system, is in use in Mediterranean countries.

In one large California establishment the oil has been recovered by pulping the fruit in a tomato pulper, mixing the pulp with warm brine and separating the oil, pulp and brine in a cream separator. This process greatly reduces labor costs and has promise of being adaptable on a commercial scale. G. W. Shaw in 1903 obtained a fairly satisfactory separation of oil and pulp in a large sugar centrifugal. (See Bull. 158, Univ. of Calif. Expt. Sta., 1904.) Oils extracted by solvent usually carry the taste of the solvent, such as gasoline or carbon bisulphide.

In the olive-oil manufacturing countries of Europe, the pomace—the substance of the fruit remaining after expression—is dried and the remaining oil extracted with a solvent, usually CS_2, which is recovered by distillation. This oil is refined to remove excess color and objectionable odors; data on methods used are not available, but treatment with a current of steam in vacuo is stated to remove any trace of the solvent and "off" odors.

In California, the press cake is used for boiler fuel, or is spread in the orchard to improve soil texture and to supply humus. It has little fertilizing value.

Refining Olive Oil

Olive oil often acquires disagreeable flavors and odors, or becomes rancid, or is too dark in color. Mild odors and flavors can be removed by passing a current of carbon dioxide through the oil at 190 to 200 deg. F. for 1 to 3 hours. Treatment with a current of steam under vacuum will usually remove less volatile odors.

Free fatty acid can be neutralized with sodium carbonate or bicarbonate in the presence of a small amount of water and by heating to a moderate temperature. Soap, formed by the union of the fatty acid (principally oleic acid) and the alkali, can be removed by filtration with infusorial earth, or may be skimmed from the surface of the vat. Agitation during neutralization is necessary.

C. C. Scalione and the writer experimented upon the treatment of about 30,000 gal. of olive oil of dark color and "ensilage" odor and flavor. The process finally adopted was as follows: The oil was mixed with 2 per cent by weight of finely ground bone black, to remove excess color, 0.2 per cent sodium carbonate and 0.3 per cent by volume of water; 1 per cent by weight of Filter-Cel was added immediately preceding final filtration.

The mixture was heated in a tin steam-jacketed tank to 190 deg. F. for 2 hours. During treatment the oil was constantly stirred by a mechanical agitator and a stream of carbon dioxide was passed through it. After standing over night it was bag filtered, giving a clear, light-colored oil of neutral flavor. After several months' storage the oil developed a flavor similar to that of high-quality Italian oil.

Large refineries and blending establishments exist in Lucca and Marseilles for oil purchased from small producers. As a result the export oils of Italy and France are of uniform quality. California badly needs a large and centrally located refining establishment, in order to standardize the product.

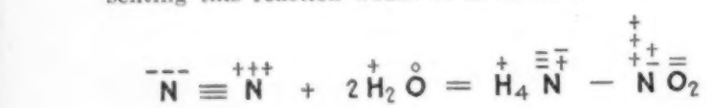
Fixation By Hydrolysis?

The Hydrolysis of Nitrogen May Form the Basis for a New Fixation Process to Be Carried On at Ordinary Temperature but at High Pressure

By K. George Falk* and Ralph H. McKee†

IN THE DISCUSSIONS of electronic valence theories in connection with chemical reactions, the general procedure has been to adapt the theories to previously known facts. The present paper describes the reverse process, an attempt to test certain deductions from theoretical views by experiments.

According to the valence theory published a number of years ago,[1] the two atoms of nitrogen in such a molecule as the nitrogen molecule differ from each other, one having a negative character and the other a positive character. If this be true, then from the analogies drawn mainly from the reactions of organic chemistry, the nitrogen molecule would be hydrolyzed in such a way that from each molecule one ammonium radical and one nitrous acid radical (NO_2) would be formed. The equation representing this reaction would be as follows:



or as ordinarily written:

$$N_2 + 2H_2O = NH_4NO_2$$

As a rule, in hydrolysis reactions, the valence of the atoms involved does not change in the sense that oxidation or reduction has occurred.[2]

Such a reaction being one which is dominantly reversed at higher temperatures, it was obviously desirable to carry out the experimental work at room temperature or below.

Effects of Pressure and Catalyst

The early experiments were made by simple contact of nitrogen at 300 lb. pressure with water at room temperature in an iron tube. The resulting solution was analyzed by the ordinary methods used for water analysis when ammonia, nitrites and nitrates are to be determined. Approximately 6 parts of nitrogen per million of water were found to have been hydrolyzed. One-half of this proved to be present as ammonia and the other half partly as nitrite and partly as nitrate. The nitrogen used carried a small percentage of oxygen. Moreover, it was difficult to keep oxygen out of the apparatus, and accordingly the formation of nitrates may be due in part to this oxidation. Furthermore, one would expect the formation of some nitrates by intermolecular oxidation of the nitrite.

An old, almost discredited reaction takes on an unusual significance in view of this work. The authors state: "If proper catalytic agents were known for this reaction—in other words, reagents which would give a high reaction velocity—it would seem as if the process has a possibility of competing with the present Haber and Claude processes in that it is very much easier to work at ordinary or low temperatures with water and nitrogen than to work at red heat with gases such as the nitrogen-hydrogen mixture."

When the reaction is carried out in glass or silica vessels no appreciable hydrolysis of the nitrogen is obtained. However, the putting in of a carefully cleaned piece of iron, say a wire nail, is sufficient to bring about the hydrolysis.[4]

If the temperature was raised to as high as 60 deg. C., the amount of ammonia and nitrite (and nitrate) found was inappreciable. Apparently 60 deg. is too high a temperature to permit one to get appreciable quantities of the hydrolyzed product. If the reaction was carried out at 0 deg. by placing the tube in an ice chest, the amount obtained was increased.

If the hydrolysis is of the simple type indicated by the theory, then increases of pressure of nitrogen or change of solvent so as to increase the solubility of nitrogen in water should increase proportionately the amount of hydrolyzed nitrogen—that is, ammonia and nitrite—obtained. Experiments using nitrogen at 1,800 lb. pressure gave the expected increased percentage of ammonia and nitrite. The solubility of nitrogen gas in alcohol and in acetone is in each case approximately eight times the solubility of this gas in water at the same temperature. Experimentally acetone and alcohol carrying small percentages of water, say 10 per cent, were found to give a greater yield of ammonia and nitrite than does pure water under similar treatment.

The opportunity of carrying out this reaction at very high pressures such as those used by Claude (15,000-20,000 lb. per sq.in.) in his ammonia synthesis from nitrogen and hydrogen was lacking. If proper catalytic agents were known for this reaction—in other words, reagents which would give a high reaction velocity—it would seem as if the above process has a possibility of competing with the present Haber and Claude processes in that it is very much easier to work at ordinary or low temperatures with water and nitrogen than it is to work at red heat with gases such as the nitrogen-hydrogen mixture at present used.

In reviewing the literature, it is interesting to note that although such a nitrogen fixation process was suggested more than 80 years ago, it was not submitted to thorough experimental study, partly because the results obtained at first were contradictory and partly because a satisfactory theoretical basis was lacking. For example, T. Sterry Hunt[5] suggested the possibility of the occurrence of this reaction. G. C. Schaeffer[6] advanced similar views in 1856. The experimental results of Schonbein,[7] Zabelin,[8] Loew[9] and von Lösecke[9] indicated the occurrence of this reaction. On the

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[1] K. G. Falk and J. M. Nelson, *J. Am. Chem. Soc.*, vol. 32, pp. 1637-54 (1910); in the present connection especially pp. 1646-8.

[2] *Cf.*, J. M. Nelson, H. T. Beans and K. G. Falk, *J. Am. Chem. Soc.*, vol. 35, p. 1816 (1913) and the references quoted there.

[3] Lewis and Randall, pp. 597-8 of "Thermodynamics and the Free Energy of Chemical Substances" (McGraw-Hill Book Co.), 1923, by calculation from the free energies concerned reach the conclusion that the simple hydrolysis of nitrogen would require having the nitrogen under enormously high pressures. However, they did not include the condition that the energy might be furnished by a third substance such as the iron used as a "catalyst" in the present experimental work.

[4] *Am. J. Sci.*, vol. 5, p. 407 (1848).

[5] *Am. J. Sci.*, vol. 12, p. 409 (1863).

[6] *J. pr. Chem.*, vol. 84, p. 193 (1861); *Am. Chem. Pharm.*, vol. 124, p. 1 (1862).

[7] *Ann. Chem. Pharm.*, vol. 130, p. 80 (1864).

[8] *Z. f. Chem.*, vol. 13, pp. 65, 269 (1870); *Ber.*, vol. 23, p. 1413 (1890).

[9] *Arch. Pharm.* (3), vol. 14, p. 54 (1879).

other hand, the results of Bollig,[10] Bottger,[11] Than,[12] Carius,[13] Weith and Ad. Weber,[14] Berthelot,[15] Leeds,[16] Baumann[17] and Neumann[18] were negative. It is not surprising, therefore, that in the more modern reviews[19] of this question the non-occurrence of the reaction in question should have been emphasized.

The occurrence of combined nitrogen in rain-water has also been studied at various times.[20] The question may be raised as to how much of this combined nitrogen has resulted from the hydrolysis of nitrogen reaction, followed possibly by secondary changes of the primary products.

The theoretical views also suggest the possibility of another group of reactions. Since the nitrogen atoms in diazo and diazonium compounds are charged differently[21] just as they are in the nitrogen molecule, it might be expected that under suitable experimental conditions it would be possible to form diazo and related compounds by the action of nitrogen (presumably under pressure) upon various benzene or naphthalene derivatives.

[10] *Ann. Chem. Pharm.*, vol. 125, p. 21 (1863).

[11] *Frankf. Ztg.*, Feb. 26, 1870; *Chem. Centralb.*, 1870, p. 161.

[12] *J. pr. Chem.*, vol. 1, p. 415 (1870).

[13] *Ann. Chem. Pharm.*, vol. 174, p. 31 (1874).

[14] *Ber.*, vol. 7, p. 1745 (1874).

[15] *Ann. chim. phys.* (5), vol. 12, p. 445; *Bull. soc. chim.* (2), vol. 27, p. 338 (1877).

[16] *Chem. News*, vol. 40, p. 70 (1879); vol. 49, p. 237 (1884).

[17] *Landw. Vers.-Stat.*, vol. 35, p. 217 (1888).

[18] *Chem. Centralb.*, 1890, I, p. 665.

[19] *Cf.*, Abegg's "Handbuch der Anorganischen Chemie" (1907), Vol. III, Part 3, p. 302; L. Spiegel, "Der Stockstoff," 1903, pp. 96, 111, etc.

[20] For example, E. J. Russell and E. H. Richards, *J. Agric. Sci.*, vol. 9, p. 309 (1919); F. T. Shutt, Canada Expt. Farms Rept., 1918, p. 19; *Expt. Sta. Rec.*, vol. 41, p. 510; J. Frieschmann, *Chem. News*, vol. 119, p. 49 (1919), etc.

[21] *Cf.*, Falk and Nelson, footnote 1; J. Stieglitz, *J. Am. Chem. Soc.*, vol. 30, p. 1798 (1908); vol. 44, p. 1311 (1922).

Fifty Years in the Coal-Tar Industry

Some Memories, Experiences and Criticisms of English and American Practice

By T. H. Davis

Consulting Chemical Engineer, Newark, N. J.

On the 30th of June, 1873, I left the Royal School of Mines and Royal College of Chemistry, London, and on July 1, 1873, entered the coal-tar distilling works of John Clarkson Major at Wolverhampton as chief chemist.

At that time the coal-tar industry was rather different from what it is today, for then we knew of nothing except pure coal tar as derived from the carbonization of the best English gas coals in horizontal cast-iron or fireclay retorts. Water-gas and coke-oven tar were then unknown. There were, however, experimental plants for the dissociation of steam by passing it over red-hot iron (usually chains). There were also patents for passing air through coal-tar naphthas to produce an illuminating gas. These were the forerunners of the water-gas systems of the present day.

In 1873 the distillation of coal tar was carried on just about the same as now. The tar was distilled in the regular English "cheesebox" stills, each holding 10 to 20 tons. Distillation was conducted in practically all works by warm specific gravities, as temperature distillation was not then thought so reliable. Generally the distillate was separated into first runnings, light oil, creosote oil and anthracene; the remaining pitch, being very hard, was "cut back" with some of the distilled oils.

The light oil was run so as to contain, as far as possible, all the carbolic acid, which was extracted to the extent of about 2 gal. of "crude carbolic" per ton of tar distilled. The light oil was then distilled into several fractions.

In the refinery we at first made 30 per cent, 50 per cent and 90 per cent water-white benzol, solvent naphtha and "burning" naphtha, the latter being used with petroleum benzine in the old-fashioned "flare" lamps, then extensively employed by circuses and other outdoor entertainments.

In 1875 Mr. Major came to my laboratory and told me that his customers required a higher grade of benzol. Steps were at once taken to produce the pure product—for which we used a modified "Coffey" still. He also asked me to make toluol. I believe I was one of the first coal-tar chemists to produce tuluol in commercial quantities.

The year 1873 being practically the beginning of the intensive production of anthracene, my attention was particularly directed to this product. I had the pleasure of experiencing the vicissitudes which were passed through before a good and satisfactory product was obtained and a fairly perfect test devised.

My first work on anthracene turned out a product 20 to 25 per cent pure by the old "alcohol test." Soon, through the kind personal advice of the late Dr. William Perkin, I was able to produce higher grades.

The various tests suggested and used were particularly interesting, ranging, as they did, from the "alcohol test," with its controlling melting point, through the "bisulphide test," the "permanganate appendix," the "anthracene-quinone test," to this last test with the "sulphuric acid appendix," this being now used to determine the commercial purity of anthracene. Not only was a fairly correct test evolved in my time, but now the anthracene produced has risen in purity from about 25 per cent in 1873 to 80 or 90 per cent at the present time.

Experiences With American Distillers

With regard to the coal-tar industry in the United States, during my experience of 20 years the development does not appear to have been rapid. However, it received a powerful impetus during the late world war, the intensive production of that period being fairly maintained to the present time. However, coal tar produced in this country has decreased much in chemical value by reason of the development of coke ovens and the generally high temperature at which coal is carbonized in gas works. The coke-oven process deprives the coal tar of qualities valuable to the distiller. Today's tar, on the average, is valuable only for creosote oils and pitch, plus an abundance of naphthalene.

During my 50 years' association with the industry I have not seen any material change in the *modus operandi* of coal-tar distilling. Several changes have been tried, such as the use of steam and air, continuous distillation and such like; but still the majority of works appear to carry on in the same old way.

Two important changes have developed, the intensive production of refined naphthalene and of cresylic acid, neither of which was considered of much consequence in my early days. Altogether it seems that present-day coal-tar distilling is just about the same as 50 years ago. American coal-tar distillers particularly seem to be satisfied with the production of creosote oils and pitch and do not seem disposed to make any changes or even to develop this work to the extent of European systems.

How Relative Drying Time May Be Approximated

The Derivation of a Set of Useful Curves That Suggest a Method by Which One of the Important Problems of Drying May Be Satisfactorily Solved

By Elliott B. Atwater and Roy A. Borkland
Case School of Applied Science, Cleveland, Ohio

IN DRYING solid materials, the performance of the available machines under variable conditions must be predicted from experience and judgment. The operator of such a machine may know, for instance, the time and cost of drying a certain material from 20 per cent moisture content to 10 per cent moisture content, but he has no way of predicting how long it would take and what the cost would be if he were to carry on the process to remove an additional 5 or 10 per cent of moisture.

With the intention of constructing curves which would permit an approximation of the relative time for drying solid materials between any given moisture contents, we conducted the tests which form the basis of this paper.

A careful search of the literature of engineering revealed but one other attempt to arrive at such a result as we sought. In July, 1919, the *Journal of the Society of Chemical Industry* published a paper entitled "Drying by Heat in Conjunction With Mechanical Agitation and Spreading," by Eustace A. Alliott. This gave the results of a test similar to those which we made, carried out by the author at the works of the Manlove, Alliott Co., Ltd., Nottingham, England.

His test was made in a machine similar to the one used in our test. The charge used was 140 lb. of Prussian blue and the run was carried from about 60 per cent of moisture down to a fraction of 1 per cent of moisture. Although this test was conducted under vacuum conditions, the similarity between this curve and some of our curves is apparent. To the best of our knowledge this test furnishes the only data that have been published on the subject.

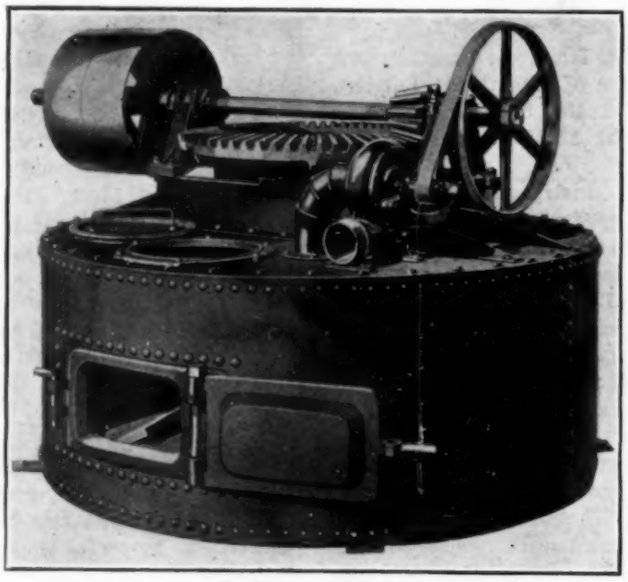

FIG. 1—THE DRIER USED IN THE TESTS

The Apparatus Employed

The drier with which our tests were made is one designed and built by the C. O. Bartlett & Snow Co., Cleveland, Ohio, to which we are indebted for the use of the machine and valuable suggestions concerning methods of procedure. Fig. 1 shows this drier.

The machine is a 6-ft. pan drier, commonly known to the trade as the Triumph Steam Drier. It consists essentially of a closed tank circular in shape and of a diameter three times the height. Jackets are provided on the entire bottom and well up on the sides, so that as much available heating surface is maintained as is possible. An oblong door in the side is provided for the withdrawal of the charge.

Within the tank proper is a central shaft provided with two sweeps set very close to the bottom, in such a manner that they shall slide under the charge, imparting to it an undulatory motion, without cutting through the material. The tank is of a shallow form in order that the amount of heating surface in proportion to the mass of the charge may be as great as possible and in order that the heavy mass of soggy material may lie as loosely as possible. Greater height and capacity could be obtained only at the expense of operating time and greater consumption of agitating power. The top of the tank is provided with charging manholes and an induced-draft fan to remove the vapors of desiccation. A steam trap is provided to take care of jacket condensation.

The apparatus was set up in the boiler room of the Mechanical Building at Case School. A 7½-hp. d.c. shunt motor (1,150 r.p.m.) was used to furnish the required power. An ammeter in series with the motor line was used to measure the fluctuations in the power consumed. A condensate tank and a platform scale were used to measure the steam consumption. A reducing valve placed in the steam inlet line maintained the steam pressure at 85 lb. gage during all the tests. A constant pressure was essential, for a variation in the pressure would cause a change in the temperature of the machine which would affect the rate of drying and introduce error into the results. The motor, having a 5-in. pulley, was connected by a belt to a 40-in. pulley on the horizontal shaft of the drier. This was necessary in order to reduce the speed to that recommended by the manufacturer.

The particular drier used in these tests is essentially a small drier and consequently its uses are limited. Nevertheless, nearly 1,000 of them have been placed in operation in various industries.

In the chemical industry it is used as a small drier for miscellaneous materials; in the packing house and

rendering industry for drying tankage; in the dynamite industry for drying sawdust and dynamite mixtures; in the powder industry for drying nitrate of soda; in the artificial leather industry for drying wood dust and straw dust. It is generally used for drying inorganic rather than organic materials.

How the Tests Were Conducted

The machine was set up as shown Fig. 2. Tests were run on several different types of materials having different characteristics in order to determine the influence these characteristics might have on the rate of drying. Coal, sawdust, gypsum, clay and sand were the materials used. The material was first weighed dry and then charged into the machine; a charge of 500 to 600 lb. was the usual amount. The machine was started and water hose turned into it until the material was thoroughly saturated with water.

The steam was then turned on and a few minutes allowed to elapse for conditions to become constant.

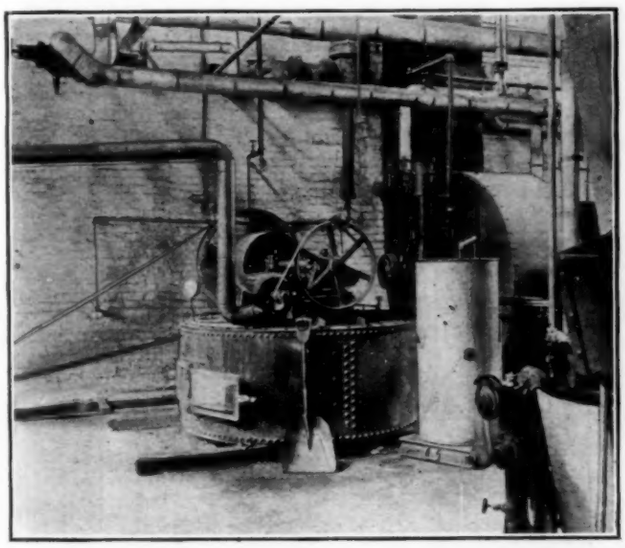

FIG. 2—HOW THE DRIER WAS SET UP FOR THE TESTS

A sample of the material was then taken and from this time on to the end of the test samples were taken at regular intervals increasing from 5-10 minutes at the beginning to 30 minutes toward the end of the test.

The method of taking the samples was simple. The manhole door was opened, and a shovelful of the material scooped out while the machine was running. After stirring a few seconds, a small sample of the material was transferred to a 250-c.c. glass beaker the weight of which had previously been determined. The remainder of the shovelful was returned to the machine.

In order to test the accuracy of our sampling method, a second shovelful of material and a second sample were taken each time on several of our runs. Our results checked satisfactorily, so that on the last runs only single samples were taken.

Immediately after being taken from the machine, the samples were carefully weighed on a small gram balance reading to tenths of a gram. This accomplished, they were transferred to a small oven, where they were allowed to remain several hours until thoroughly dry. (The core oven in the foundry room of the Mechanical Building was the one used in these tests. Approximate temperature 140 deg. C., or 284 deg. F.) The dried samples were then removed from the oven and weighed.

The weight of the beaker subtracted from the sample weights as above determined gave us the net weight of the wet sample and the net weight of the dry sample. Their difference divided by the net weight of the wet sample gave us the percentage of moisture in the wet sample; 25 per cent moisture means that 100 parts of the wet material contains 25 parts of water and 75 parts of dry material.

From these data we plotted the desired moisture curves, using "per cent moisture" as ordinates and "time minutes" as abscissas. These curves show the amount of moisture in the material at every moment through the test.

As each sample was taken, readings were made and recorded of the following items: Time; weight of condensate; weight of empty beaker; weight of wet sample plus beaker; motor current in amperes.

Some Observations on the Test

It might be thought that with finely powdered materials considerable dust would be created. This is not the case, however, under any ordinary circumstances and even when the material is taken down to a very high degree of dryness, very little is carried over, owing to the slow speed of the sweeps.

The steam consumed by the machine averaged about 1.7 lb. per pound of moisture evaporated. Under favorable conditions this figure was reduced to 1.0 lb. of steam per pound of moisture evaporated. On an hourly basis, this would be an average of 92 lb. of steam used per hour, with a low rate of about 63 lb. of steam per hour under favorable conditions. The steam used was probably somewhat wet, so the above figures would be lower with drier steam.

The average power required by the machine was about 0.308 hp. per 100 lb. actual weight of the charge. A tabulation of steam consumption and power requirements are given in Tables I and II.

Results Obtained With Coal

The test on coal as a material was made on a charge of 325 lb. of slack coal. The results of this test are shown in Table III. The curve shown in Fig. 3 was plotted from these results. The curve for this run extends from 23.6 per cent moisture at saturation down to 1 per cent of moisture at the end of 2 hours of drying. The lower part of this curve is probably a little high—

TABLE I—STEAM CONSUMPTION

Wt. of Material Lb.	Moisture Per Cent		Per Cent Moisture Evap.	Moisture Evap., Lb.	Steam Used, Lb.	Ratio Steam Evap. to Moisture	Time (Min.)	Material
325	23.6	0.1	22.6	74	139	1.87	127	Coal
378	52.2	0.3	51.9	197	646	3.28	310	Sawdust
606	16.2	0.0	16.2	98	120	1.23	62	Gypsum
500	39.7	2.3	37.4	187	145	0.78	170	Clay
585	16.0	0.2	15.8	93	53	0.51	76	Sand
...	....	...	....	649	1,103	1.70	745	Total of all tests but sawdust
378	52.2	0.3	51.9	197	646	3.28	310	Sawdust
...	....	...	....	452	457	1.01	435	Total of all tests

TABLE II—POWER CONSUMPTION

Material	Wt. Charge	Volts	Amp.	Amp. Per 100 Lb.
Sawdust	378 lb.	220	9	2.38
Gypsum	606	220	7	1.15
Clay	500	220	6	1.20
Sand	585	220	9	1.54
Average	517	220	7.75	1.5

Average motor input per 100 lb.: $1.5 \times 220 \times 1.34 = 0.44$ hp.
Motor efficiency at fractional load assumed to be 70 per cent.
Average power consumption of machine $0.44 \times 0.70 = 0.308$ hp. per 100 lb.

that is, the percentage of moisture on the flat portion of the curve should be a fraction of 1 per cent lower. For this reason this part of the curve has been shown as a dotted instead of a full line.

In drying the coal samples the temperature was allowed to become too high (estimated to have been 150

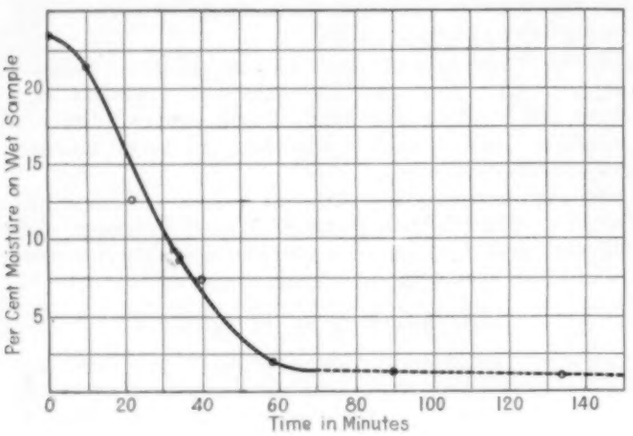

FIG. 3—THE CURVE FOR COAL

deg. C., or 329 deg. F.) This undoubtedly caused volatile matter to be expelled with the moisture and renders the entire curve somewhat high. The effect is very slight, however, and is only of consequence at the lower percentage of moisture which are apt to be misleading in that they are a fraction of a per cent high and the efficiency of the machine suffers.

TABLE III—COAL RUN WITH 325 LB. (DRY BASIS) OF SLACK COAL MARCH 2, 1923

Number Beaker	Time Run	Time Elapsed	Cond. Wt.	Cond. Wt.	Beaker Wt.	Wt. Wet Sample Beaker	Wt. Dry Sample Beaker	Wt. Wet Sample	Wt. Moisture	Per Cent Moisture	Power Amp.
1	9:36	0	174	0	87.9	282.5	236.5	194.6	46.0	23.6	No.
2	9:46	10	...	...	65.0	183.6	158.2	118.6	25.4	21.5	Read-
3	9:57	21	238	64	72.5	202.3	186.0	129.8	16.3	12.6	ings
4	10:16	40	242	68	71.5	205.0	194.5	133.5	10.5	7.9	
5	10:35	59	257	83	65.5	220.0	217.2	154.5	2.8	1.8	
6	11:06	90	269	95	60.2	204.7	203.1	144.5	1.6	1.2	
7	11:43	127	314	139	73.0	224.2	222.6	151.2	1.6	1.0	

The initial charge of sawdust was 621 lb., but it was necessary to remove some of this amount, as the load on the machine was too great. The load was not caused so much by the actual weight of the charge as by the pressure on the sweeps as they squeezed the material against the roof or top of the machine. About 243 lb. was removed, leaving a charge of 378 lb. This brought the surface of the material several inches from the top and relieved the excess pressure.

A 5-hour run, taking double samples each time, was made. The results of this run are shown in Table IV and the curve plotted from these results appears in Fig. 4. The curve shows the moisture content to have been reduced from 52 per cent of moisture to 0.3 per cent of moisture in the 5 hours of the run. It also shows that a uniform removal of moisture from this material takes place for the first 2 hours of the run, or down to about 10 per cent of moisture. At this point the curve flattens and the remaining 10 per cent of moisture requires 3 hours to be removed, still leaving 0.3 per cent of moisture in the material.

On this run the sawdust was saturated with water as explained in the procedure. What this percentage of

TABLE IV—SAWDUST RUN WITH A CHARGE OF 378 LB. (DRY BASIS) OF MATERIAL—MARCH 16, 1923

Number Beaker	Time Run	Time Elapsed	Cond. Wt.	Cond. Wt.	Beaker Wt.	Wt. Wet Sample Beaker	Wt. Dry Sample Beaker	Wt. Wet Sample	Wt. Moisture	Per Cent Moisture	Power Amp.
1	9:30	0	117	0	88.5	165.2	125.0	76.7	40.2	52.2	17
2	9:40	10	175	58	65.2	137.6	107.0	72.4	35.6	49.2	13
3	9:40	10	...	....	72.8	150.7	113.1	77.9	37.6	48.3	
4	9:55	25	246	129	71.8	136.2	106.2	64.4	30.0	46.5	14
5	9:55	25	...	....	65.7	134.3	103.4	68.6	30.9	45.2	
6	10:10	40	...	....	60.5	131.5	101.9	71.0	29.6	41.6	13
7	10:10	40	...	....	73.3	139.8	112.3	66.5	27.5	41.3	
8	10:25	55	389	272	50.2	111.2	88.3	61.0	22.9	37.5	12
9	10:25	55	(Dr'nd	235)	89.8	113.8	94.4	54.0	19.4	35.9	
10	11:06	96	215	332	55.7	104.1	93.8	48.4	10.3	21.3	10
11	11:06	96	...	....	47.1	93.9	83.1	45.8	9.8	21.4	
12	11:30	120	317	434	53.3	105.1	99.8	51.8	5.3	10.2	9.5
13	11:30	120	...	....	90.1	139.5	134.5	49.4	5.0	10.2	
14	11:47	137	385	512	70.6	121.1	117.5	50.5	3.6	7.1	9
15	11:47	137	(Dr'nd	296)	79.2	129.7	126.1	50.5	3.6	7.1	
16	12:00	150	149	572	65.7	124.7	121.5	59.0	3.2	5.5	9
17	12:00	150	...	....	60.5	115.8	112.7	55.3	3.1	5.6	
18	12:30	180	156	579	73.2	134.8	132.7	61.6	2.1	3.4	8.5
19	12:30	180	...	....	50.2	105.0	102.8	54.8	2.2	4.0	
20	1:00	210	166	589	59.6	112.6	111.7	53.0	0.9	1.7	9
21	1:00	210	...	....	55.7	109.3	108.2	53.6	1.1	2.0	
22	2:00	270	193	616	47.0	102.5	102.0	55.5	0.5	0.9	9
23	2:00	...	...	....	53.3	111.3	110.8	58.0	0.5	[illegible]	
24	2:40	310	223	646	90.1	144.0	143.8	53.9	0.2	0.4	9
25	2:40	...	...	....	70.7	129.3	129.1	58.6	0.2	0.3	

moisture was we do not know, for so much moisture-steam was generated that the machine could not be approached for over an hour on account of the intense heat. The first sample we were able to take showed about 52 per cent of moisture to be present.

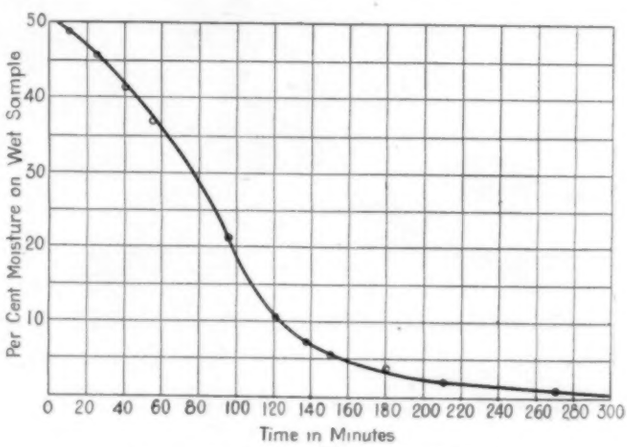

FIG. 4—THE CURVE FOR SAWDUST

The first run on this material was made with a charge of 415 lb. This run was discarded, however, as the results showed the maximum percentage of moisture to be less than 10 per cent, which would give only a very short curve. The second run was made with a charge of 606 lb. of material from 16.2 per cent of

TABLE V—GYPSUM RUN WITH A CHARGE OF 606 LB. (DRY BASIS)—APRIL 13, 1923

Beaker Number	Time Run	Time Elapsed	Cond. Wt.	Cond. Wt.	Beaker Wt.	Wt. Wet Sample Beaker	Wt. Dry Sample Beaker	Wt. Wet Sample	Wt. of Moisture	Per Cent Moisture	Power Amp.
1	10:00	0	...	..	88.2	560.6	484.4	472.4	76.2	16.2	10
2	10:12	12	...	..	78.9	548.4	484.2	469.5	64.2	13.6	8
3	10:12	12	...	..	72.6	553.4	489.0	480.8	64.4	13.4	8
4	10:22	22	112	0	71.5	528.4	490.0	456.9	38.4	8.4	14
5	10:22	22	112	0	65.5	566.6	521.0	501.1	45.6	9.1	14
6	10:32	32	115	3	60.3	440.9	426.5	390.6	14.4	3.8	13
7	10:32	32	115	3	57.2	470.0	454.4	418.2	15.6	3.8	13
8	10:47	47	117	5	50.2	380.9	380.4	330.9	0.5	0.15	8
9	10:47	47	117	5	59.4	378.9	378.4	319.5	0.5	0.15	8
10	11:02	62	120	8	55.7	400.0	400.0	344.3	0.0	0.0	7
11	11:02	62	120	8	47.0	391.0	391.0	344.0	0.0	0.0	7

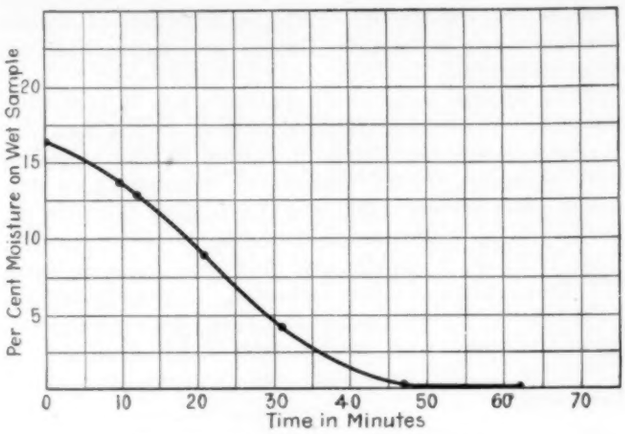

FIG. 5—THE CURVE FOR GYPSUM

moisture to 0.0 per cent of moisture and lasting 62 minutes. The results of this last run are tabulated in Table V. From these results the curve in Fig. 5 was plotted.

Results Obtained From Fireclay

This run was made with a charge of 500 lb. of material. The moisture was reduced from 39.7 per cent to 0.67 per cent in 170 minutes. At the beginning of the

TABLE VI—FIRECLAY RUN WITH A CHARGE OF 500 LB. (DRY BASIS) OF MATERIAL—APRIL 20, 1923

Beaker Number	Time Run	Time Elapsed	Cond. Wt.	Cond. Wt.	Beaker Wt.	Wt. Wet Sample Beaker	Wt. Dry Sample Beaker	Wt. Wet Sample	Wt. of Moisture	Per Cent Moisture	Power Amp.
1	10:05	0	100	0	88.2	426.0	292.4	337.8	133.6	39.7	6.5
2	10:15	10	151	51	78.9	414.5	284.3	335.6	130.2	38.7	6.5
3	10:25	20	154	54	72.6	450.1	314.6	377.5	135.5	37.1	6.7
6	10:30	25	154	54	60.3	478.7	335.0	418.4	143.7	34.3	7.0
7	10:42	37	154	54	57.2	498.6	363.2	441.4	135.4	30.7	7.6
8	10:55	50	154	54	50.0	436.6	339.2	386.6	97.4	25.2	11.5
9	11:15	70	158	58	59.4	446.0	374.0	386.6	72.0	18.6	13.0
10	11:30	85	162	62	55.7	391.0	333.8	335.3	57.2	17.0	10.5
11	11:45	100	169	69	47.0	381.2	329.0	334.2	52.2	15.6	9.0
12	12:15	130	190	90	53.1	346.2	318.3	293.1	27.9	9.5	6.0
13	12:55	170	245	145	90.0	328.1	322.6	238.1	5.5	2.3	6.0

run the clay was in the form of a heavy paste. At about 20 per cent of moisture after about 65 minutes of drying, this paste began to form into large balls or clods. This slowed the rate of drying considerably and the curve shows a flattened portion or step for the next 50 minutes, during which time the sweeps had succeeded in crushing most of the larger balls into smaller ones and some of the latter into the powder form. The

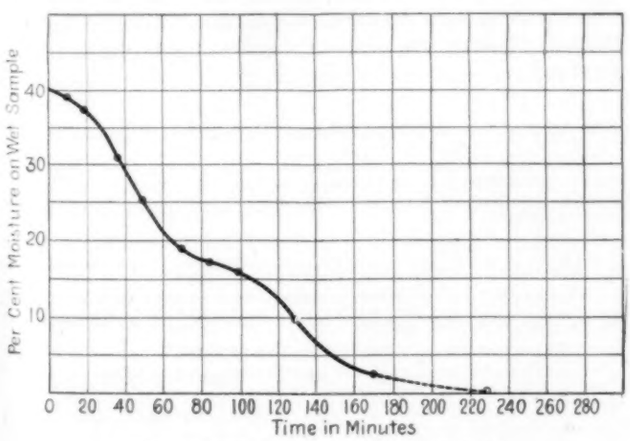

FIG. 6—THE CURVE FOR FIRECLAY

formation of these lumps also caused an increase in the power used amounting to nearly 100 per cent at the worst stage. After this second interval of 50 minutes, by which time the percentage of moisture had been reduced to about 12 per cent, the curve again assumed its former slope to 2.3 per cent at the end of the run, where it began to show signs of again flattening. The results obtained in this test are tabulated in Table VI. From these the curve in Fig. 6 was plotted.

Results Obtained With Sand

The sand run was made on 600 lb. of material as charged. A sample of the charge showed 2.4 per cent moisture present, making the charge 585 lb. of dry material.

TABLE VII—SAND RUN WITH A CHARGE OF 585 LB. (DRY BASIS) OF MATERIAL, APRIL 27, 1923

Beaker Number	Time Run	Time Elapsed	Cond. Wt.	Cond. Wt.	Beaker Wt.	Wt. Wet Sample Beaker	Wt. Dry Sample Beaker	Wt. Wet Sample	Wt. Moisture	Per Cent Moisture	Power Amp.
1	As charged	...	...	..	88.2	364.6	357.9	276.4	6.7	2.4	....
2	Cold	..	...	..	78.9	503.8	427.6	424.9	76.2	17.9	....
3	10:40	0	184	0	72.6	466.6	403.5	394.0	63.1	16.0	10
6	10:45	5	194	10	60.3	434.0	383.6	373.7	50.4	13.5	10
7	10:51	11	201	17	57.2	449.2	404.9	392.0	44.3	11.3	11
8	11:00	20	208	24	50.0	329.5	308.4	279.5	21.1	7.55	12.5
9	11:21	41	216	32	59.4	332.1	327.2	272.7	4.9	1.80	9.0
10	11:36	56	225	41	55.7	394.3	393.2	338.6	1.1	0.33	~9.0
11	11:56	76	237	53	47.0	370.6	370.0	323.6	0.6	0.19	10

The test lasted 76 minutes, during which time the percentage of moisture present was reduced from 16.0 per cent to 0.2 per cent. From this test the figures in Table VII were obtained. These were used for plotting the curve in Fig. 7.

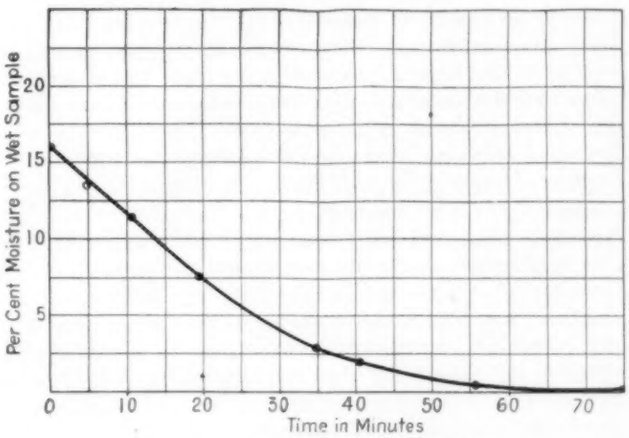

FIG. 7—THE CURVE FOR SAND

It may be said that while these figures refer to a particular drier, they also have an important bearing on results in other types.

At present the capacity and performance of these machines under different conditions is largely a matter of judgment. The data we have secured in these tests should be valuable as a basis for predicting results under varied conditions and also for reference in designing special machines. The curves for the several characteristic materials are valuable in that from them the relative time for drying solid materials between any given moisture content may be closely approximated.

It is to be remembered that the times found in these tests are not to be considered as absolute. The absolute times are correct only for the given machine and

the given amount of charge. The relative times or the relation between the lengths of time between any given moisture contents is the problem with which we have been concerned. To put it concretely, we might suppose that it requires a definite length of time, say 15 minutes, to dry a given material similar in characteristics to sawdust from 20 per cent of moisture to 10 per cent of moisture, and we desire to know the time that will be required to dry this material from 20 per cent to 1 per cent of moisture.

From the curve obtained for sawdust we find that the time required to dry from 20 per cent to 10 per cent is 120 — 98, or 22 minutes, and to go from 20 per cent to 1 per cent requires 260 — 98, or 162 minutes. The relative length of time is then 162 ÷ 22, or 7.36 to 1.

The desired time for the given material will be 7.36 times the known time (15 minutes) between 20-10 per cent, or 7.36 times 15 minutes. This gives 110 minutes as the approximate time which will be required to dry the given material from 20-1 per cent of moisture.

Acetone as a Blending Agent in Composite Motor Fuels

Its Fuel Properties, Miscibility with Other Motor Fuels, and Failure to Detonate Suggests New Use for This Chemical

Writing in *The Journal of the Society of Automotive Engineers* for July, 1923, R. F. Remler[1] presents an interesting review of the use of acetone in composite fuels. He points out the fact that except for recent patents, the majority of which have been issued abroad, there is no technical literature on this subject. The fact that most study has been made in foreign countries is due to the higher price of motor fuel in those countries and the natural search for substitutes for gasoline. In these inquiries engineers have turned to the first possible solution that would permit the use of the present design of engine, that is, a composite fuel.[2]

Acetone is an excellent engine fuel and in fact approaches the ideal in a number of its properties. Its low boiling-point and the resulting high vapor-pressure at ordinary temperatures facilitate the starting of the engine. Its homogeneity permits uniform evaporation and distribution, and, therefore, it is conducive to smooth running. Its low freezing-point, —94.6 deg., prevents its solidification at the coldest winter temperatures.

Acetone will not detonate and can be used in an engine with a compression-ratio as great as 7 to 1, or with a compression-pressure up to 180 lb. per sq. in.[3] It burns with a smokeless flame, does not deposit carbon in the cylinder, and, as far as can be ascertained, has no corrosive action on the cylinder or the various parts of the car with which it comes into contact.

To compete with the other fuels, however, it would be necessary to sell acetone at one-half the price of gasoline, because of the difference in the mileage obtainable. It is not my idea even to suggest acetone as an individual fuel for motor cars, as the present price and supply would not permit such utilization.

Acetone is an excellent blending agent in reducing detonation.[4,5] It is miscible in all proportions with all the liquid fuels used in motor cars, and in many instances the addition of a small percentage of acetone combines two immiscible liquids into a homogeneous solution.

That acetone reduces detonation when it is used in composite fuels is probably due, first, to the fact that it reduces the deposition of carbon in the cylinders, and, secondly, to the thermolytic decomposition that takes place between 600 and 1,000 deg. C., with the formation of methane, ethylene and carbon monoxide.[6] This reaction is endothermic and thus tends to lower the temperature in the cylinders. Acetone also will hold in solution various percentages of water, depending upon the amount of acetone present, which acts as an "anti-knock" by reducing the temperature in the cylinders.

Acetone Lessens Carbon Deposit

Patents have been granted in which claims are made that the addition of acetone in small percentages to gasoline or to various composite engine fuels minimizes the carbon deposited in the engine.[7] I have substantiated this contention by making a number of tests in which large percentages of kerosene were used with gasoline. Acetone also is used in carbon-removing compounds,[8] in which case it acts as a solvent for the asphaltic and resinous materials that bind together the free carbon.

As a fuel, acetone cannot be used alone with a carbureter containing a cork float, because of its solvent action upon the shellac coating. The claim[9] is made, however, that, where a small percentage is used in a mixture of gasoline and kerosene, its solvent action is inhibited and that it can, therefore, be employed in such composite engine fuels without injury to the float. This claim has also been substantiated by my findings.

It is stated[9] that the action of acetone on kerosene in composite fuels is to regulate its vaporization. I have noted in a sene, to which acetone saturated with acetylene had been added, that a smoother-running fuel was had, making it easier to start the engine and allowing a leaner mixture to be used.

Acetone is the most economical solvent for acetylene, as it dissolves approximately 25 times its volume in the gas at 15 deg. C., while ethyl alcohol dissolves only six times its volume. Numerous patents have indicated the addition of acetone for this purpose.[10]

C. F. Juritz,[11] in reviewing the different methods of manufacture of engine fuel by bacterial processes, finds that "acetol," a fuel consisting of alcohol and acetylene, owes its properties largely to the fact that the addition of acetone to the alcohol raises the absorption of the gas, thus increasing the volatility and calorific value of the mixture.

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[1]Industrial fellow, Mellon Institute of Industrial Research, University of Pittsburgh.

[2]*Bulletin de l'Association des Chemistes de Sucrerie et de Distillerie de France et des Colonies*, vol. 39, p. 215.

[3]*The Automobile Engineer*, February, 1921, p. 51; and March, 1921, p. 92.

[4]United States patents, Nos. 1,158,367; 1,331,054; and 1,360,872.

[5]British patents, Nos. 140,797, 1920; 176,329, 1922, addition to 174,360, 1922; 183,577, 1922; and 185,449, 1922.

[6]See *Berichte der Deutschen Chemischen Gesellschaft zu Berlin*, vol. 43, p. 2821; see also *Bulletin de la Société de la Chimique de Paris*, vol. 46, part 2, p. 268.

[7]U. S. patents, Nos. 1,296,832 and 1,399,227.

[8]U. S. patents, Nos. 1,287,589; 1,307,562 and 1,310,985.

[9]U. S. patent, No. 1,399,227.

[10]British patents, Nos. 105,256, 1916 and 178,498, 1920. Also Canadian patent No. 221,090, 1922.

[11]*So. African Journal of Industries*, vol. 4, p. 905.

A Foundry Development of Interest to Ceramists

The Methods Used by the Holley Carburetor Co., of Detroit, Indicate a New Outlet for Refractory Materials

AT THE American Foundrymen's Convention in Cleveland last May, Dr. Richard Moldenke, of Watchung, N. J., read a paper entitled "A New Long-Life Mold Development." This paper contained so much of interest, especially in its application to the producers of refractory materials, that we are quoting it here almost in its entirety.

Doctor Moldenke said, in part:

"The foundryman has always felt that the destruction of the mold every time a casting is poured in an efficient procedure. Indeed, the making of molds which could be used over and over again dates back to the Bronze Age, when implements of warfare and domesticity were made in stone molds, the two parts of which were suitably hollowed out, clamped together and poured much as our present brass ingots. These stone molds are in reality the first 'long-life' molds on record. In the development of the iron industry, with molten metal at first only as an undesirable occurrence in the operation of the small blast furnaces used, the open sand mold was the only practical means of caring for the intermittent supply of metal. As time went by, however, and the iron foundry became stabilized, the desire to construct molds which would last for more than one filling without damage asserted itself again and as early as the opening of the last century we have English patent records bearing upon the subject.

The method described in this article is a patented method, but it obviously will not prevent other methods of using refractory materials for foundry molds being developed. Also, the method here described will, if its use becomes extensive, absorb large quantities of such materials. For this reason its interest to refractory producers should be sufficient to cause them, after reading this paper, to make an investigation of the possibilities of the process and shape their policies in accordance.

"While the iron mold—or as we know it under the title of 'permanent mold'—has been known and used for perhaps a century and a half and is today attracting world-wide attention in connection with the centrifugal casting process, the method in its simpler forms has never found a solid footing in the foundry industry, the fundamental reason being that the molten metal when poured into an iron or steel mold is subjected to entirely different influences than is the case with the ordinary sand mold—the rate of cooling is so much faster, with consequent more sharply defined crystallization effects, and production of very fine grain structure if not actual chilling of the metal to whiteness. Even where the attempt is made to approximate the rate of cooling as in the sand mold, by suitably preheating the iron mold, this either falls short of the desired situation if the mold is to last, or when preheated sufficiently pouring must be done at longer intervals unless the life of the mold is to be sacrificed. The consequence has been that while good castings have been made with all the permanent mold processes brought out, the irregularity of product unless corrected by careful and costly annealing has militated against their commercial success.

"For ordinary work, therefore, it seems far better to return to the old Bronze Age idea of using the equivalent of the stone mold—in other words, a mold of the refractory surface properties of sand and yet strong enough to yield a large number of acceptable castings before considerable redressing is necessary or the mold must be discarded. This would be the 'long-life' mold. Coming down to practical considerations, the following conditions would seam to be indicated in developing such a type of mold.

"First: The mold surface must be of a highly refractory character so that the least possible heat may be transmitted inward to affect the form of the mold as well as seriously limit the rate of pouring iron for castings into it. If too much heat passes from the surfaces in contact with the molten iron into the body of the mold, the very purpose of the mold is lost, as it no longer will approximate the regular sand mold. Again, a too hot mold will warp and deteriorate rapidly. Hence, the desirability of having the mold light and if necessary air cooled, so that the mold body may not accumulate heat unduly and thus affect the rate of pouring detrimentally. The ideal situation is that of the heat conditions in the green-sand mold from which the casting has been removed just after setting—imagining this possible without destroying the mold. But a very small depth of sand will have been seriously affected by the extreme heat, and the outer portions of the mold may still be cold.

"Second: The nature of the mold material must be such that no gases are formed during contact with the molten metal, until this has set. There is little chance for venting in such a mold. A momentary consideration of this matter, however, will show that after all it is the fault of the mold if gases are formed which affect the metal surfaces. The chilled roll is a case in point. Here is no chance for venting whatever, and yet castings are made which machine up without a defective speck. Further, it is perfectly possible to cast against a firebrick surface successfully, provided the surfaces are perfectly dry and preferably warmed. Hence, if the casting surfaces of a long-life mold are of a finely granular and highly refractory nature, there need be little fear of bad results due to lack of venting.

Third: The mold surfaces must be sufficiently strong to resist the cutting action of the molten metal, and be impervious to the entrance of fine filaments of iron which on removal of the casting would take some of the mold material with it. Further, the mold surfaces must not spall off. If thoroughly dried, the last-named action should not eventuate. The strength of the mold surfaces is a question of the bond, and the property of the material a matter of the fineness of grain or crystal.

"The crucial point in the above considerations as to the nature of a desirable mold surface is the rate of removal of heat from the molten metal—whether as slow as in the case of the ordinary sand mold, or fast enough to permit some chilling action. This rate of removal of the heat until the molten metal has safely set depends upon the refractoriness of the material in greatest measure, the temperature of the molten metal and the

quantity of metal involved, and also on the freezing point and other metal characteristics. For the various sections of a casting the temperature of any point of contact between mold surface and molten metal will be practically the same at first, but the depth to which the comparatively high temperatures will penetrate the mold mass will naturally depend upon the thickness of the metal which has to set against it. Thus, if in a casting that portion ¼ in. thick imparts say 1,000 deg. F. to a point ⅛ in. within the mold mass, another portion of the same casting 2 in. thick may show the same 1,000 deg. F. at a point ⅜ in. deep within the mold mass before the metal has safely set. Practically, for 'long-life' mold purposes, it is the nature of this ⅜ in. or less—depending upon the thickness of the castings to be made—that must be carefully considered and conform to the requirements above enumerated. The rest of the mold mass can be any material that is structurally safe to hold the refractory surface true and well bonded, and will also absorb the heat passed through the mold surface material and promptly dissipate it.

"With the above underlying principles involved in the construction of the 'long-life' mold thus enunciated, it is the purpose of the writer to show how the problem of adapting these principles for everyday practical application have been worked out into a system by the Holley Carburetor Co. of Detroit. When it is stated that by this time some of the molds have already had 10,000 castings made in them and by reason of a close daily inspection of, and attention to, the refractory facing material of the molds not one of them has yet had to be discarded, the writer feels that here is truly a new development in making long-life molds. The term 'long-life' is used advisedly against 'permanent,' for in the latter the supposition is that no repairs are made on the metal mold; whereas in the former, repairs are possible and are carried out until they no longer pay.

"The system devised by the Holley Carburetor Co. has been carefully worked out in every detail and is fully patented. The several steps and the reasons for operating just that way are given in the following: As previously indicated, the primary idea has been to make a very light cast-iron mold, the surface of which is covered with a layer of highly refractory material, of necessary thickness, and this refractory material so protected from abrasion and penetration of fine iron filaments that it almost wears to a polished surface and only on rare occasion need be patched up or refaced. For operating purposes, where the castings are not large, a group of molds are placed upon a revolving table and the several steps of the cycle can be carried out almost completely automatically. Where the castings are larger and a table of three to eight molds would be cumbersome, single molds would be operated as long as molten metal is available.

"The refractory material forming the mold surface consists of two items—the refractory material itself, and the binder to bond it to the iron backing. The refractory material can be of any of the usual substances used to resist heat in the arts. Thus magnesia, bauxite, fireclay or kaolin will serve. The grain must be exceedingly fine and in the application heat must be used finally so that no question of gas-forming constituents remaining in the mass may arise. The binder must be a mineral one, an alkali silicate being most convenient, so that when heat has been applied the mass is like a thin sheet of stone. The material is preferably put on in comparatively thin layers, and each one baked on before the next is applied. For the heavier facings, the final layers can be applied by transfer from what would be a metal pattern, so that the accuracy of the finished long-life mold leaves nothing to be desired.

"The final heating—in effect a skin-drying at temperatures to almost vitrify—being accomplished, the molds are placed in their proper position on the revolving table, and successively follow their prescribed course. In passing around, the two parts of the mold are drawn apart sufficiently to allow the setting of cores, but just before this each mold successively passes a flame of acetylene gas which smokes the inner surfaces heavily. The idea of this is to interpose a film of carbon between the refractory surface and the molten metal of sufficient strength effectively to prevent any scoring action or the actual contact of metal and refractory material—this for the instant of greatest temperature effect. Most of the carbon is absorbed by the metal, but the effect is that until the molten metal is no longer dangerous, the refractory material is protected. After passing the flame and the position where cores can be set, the two parts of the mold are made to close automatically and are held thus until poured off and the metal has sufficiently set. Then they quickly open and the castings are forced out by pins or in other suitable ways. Next, a blast of air at high pressure rapidly blows the surfaces clean and the mold passes before the acetylene flame again. The man setting the cores or, in their absence, any attendant watches out for the mold surface condition as the molds pass by open, and any fragment of iron or core left in the mold is easily removed with a suitable tool."

Fluorspar Situation in the Western States

Results of an examination of the various western fluorspar deposits made by R. B. Ladoo, mineral technologist of the Department of the Interior, are set forth as follows in Serial 2480, just issued by the Bureau of Mines:

With one exception, all of the deposits worked have been so small, or so far from transportation, or contain fluorspar so mixed with silica or barite or both, that profitable production of a gravel grade of fluorspar, acceptable to eastern steel mills under present standards, has been impossible, and the future seems no more promising. There are two small mines which would yield a few hundred tons annually by screening hand-picked ore, but from present indications, these properties do not justify the erection of mills.

With only one exception, the most accessible ore from the mines which have been worked has been removed. The mines are for the most part, in poor physical condition, and future operations will be increasingly difficult and expensive.

The production of acid fluorspar west of the Mississippi River from ore bodies now known probably will not exceed 100 tons annually. It is believed that not over 3,000 tons of ground fluorspar can be annually produced, of which one-third will be low grade.

It was estimated that the properties visited in the western states can produce for a few years a maximum of 13,000 tons annually of a grade of gravel analyzing on an average 5 per cent or higher in barite, and a maximum of 4,000 tons of fluxing lump. The western steel mills, on account of the difficulty of obtaining fluorspar in gravel form, have been accustomed to use in their open-hearth furnaces both lump and gravel.

Carbonizing Coal by the Coalite Process

The Second of a Series of Papers on the Progress and Current Practice of Low-Temperature Carbonization of Coal in Great Britain

By C. H. S. Tupholme
London, England

THE processes of low-temperature carbonization of coal may be divided roughly into three classes:

1. Retorts heated from the exterior in which coal is exposed to the action of heat in thin layers. The coal is stationary during the process, and the heat reaches it by radiation, conduction and convection from the source of combustion.

2. Retorts heated from the exterior in which the coal is continually on the move during the process, so that fresh surfaces are continually exposed to the action of the heat, supplied as in (1).

3. Retorts in which a stream of hot gas is passed through the coal inside the retort.

The Coalite process belongs to the first of these classes.

The essential principle of this process is the carbonization of coal at a temperature of 1,000 deg. F. in a special retort in which the difficulties of coal expansion, retort penetration by the gas and the extraction of the resultant fuel have largely been solved. The volatile and gaseous products in this process are dealt with just as in the ordinary coke-oven plant. In fact, it may be said that 60 per cent of the Coalite plant is identical with the coke-oven process, the main difference being, of course, in the retorts.

Specimen of Coalite, showing grain and semi-coke structure

The original inventor, Thomas Parker, spent many years in experimenting with cast-iron retorts, but abandoned this type on account of "creeping" due to the heat and "blistering" from the action of the volatile products. Since the days of Parker, however, great improvements in iron retorts have been made, and with the additional knowledge it has been found possible to get excellent results with metal retorts at a considerable reduction in construction costs as compared with firebrick.

Now vertical firebrick retorts are employed in which two vertical cast-iron plates are fitted. These plates have a space between arranged so that the coal is carbonized in vertical layers of from 3 to 4 in. thick. The aim of this design is to achieve uniform carbonization, and to allow the gas to escape through the perforations in the plates into the space between. This space is under slight vacuum and is connected to an exhauster.

The protagonists of the Coalite process claim that this type of retort gives a much larger yield of gaseous products, as these have not time to be decomposed by too long contact with the retort; and also the suction prevents any tendency on the part of the gas to penetrate the retort walls and so jeopardize efficient temperature control.

On the completion of the carbonizing process, the plates inside the retort are brought together by a simple device, and thus allow the slabs of low-temperature fuel (known as "Coalite") to fall out at the bottom without sticking. These slabs fall into coolers, from which they are removed without difficulty.

Carbonization is carried out for 8 hours, the retorts being heated on the outside by producer gas, or the rich gas produced by the process, and the temperature of 1,000 deg. F. inside the retort, corresponding to 1,200 deg. F. outside, is readily gaged by the color of the flame at the gas burners, viewed through peepholes, and based on previous experience obtained with pyrometers. The gaseous products evolved by the process pass out at once from the mass through the perforated plates into the space between—that is to say, they escape freely from every part of the fuel, and the products at the bottom do not, as in the ordinary retort, have to traverse the whole hot mass above and be partly decomposed in consequence. The top of the retort is connected direct with the chimney or exhausters of the plant, and the slight suction in the retort is in contact with every portion of the fuel through the perforated plates.

The exact temperature of carbonization, which is dependent on the type of coal to be treated, is determined experimentally beforehand in a large-scale laboratory, so that the maximum yields may be obtained.

It will be seen then that the Coalite is virtually a process of low-temperature distillation, where special retorts are employed to overcome the ordinary obstructions to successful low-temperature carbonization.

The basic principle is certainly sound—i.e., the employment of a coal of low ash, known caking property and withdrawal of gas and tar into a cooler to avoid decomposition of the volatiles. So much for the principle of the process; now let us examine the commercial plant.

The commercial plant at Barnsley has been brought into operation on such a scale as to indicate that the

technical difficulties of the process are overcome. Here one standard unit of twenty retorts is in continuous service, each retort carbonizing 12 cwt., or 1,344 lb., of coal in 8 hours, a total of 36 tons of coal being treated per day of 24 hours. The plant has been designed to deal with the production of 200 retorts, and sufficient plant is laid down to deal with 100 retorts—that is, coal washer, gas holders, power house, Mond producer plant and complete recovery rectification plant. Since the success of the whole process depends on the design of the retort, only one unit has been erected, so as to give the plant a thoroughly practical test of many months' duration. All future plants will consist of an aggregation of individual units of twenty retorts, so that this plant as regards the retort is a one-unit plant.

The coal, which is a mixture of 30 per cent coking slack and 70 per cent non-coking slack, is fed into a coal washer, where mixing takes place, and the ash is reduced in the aggregate to around 5 per cent. From here the coal is taken by bucket or belt conveyors to draining bunkers, and from there to storage. From storage the coal is carried by conveyor to a charging hopper over each retort. Each hopper holds enough coal for a complete charge. A hand-operated rotary valve is used to charge the retort.

While the coal is lying in the hopper it is warmed by the heat of the retort, the result being that some of the moisture left from the washing process is driven off and the danger of charging hot retorts with cold coal is eliminated.

The vertical firebrick retorts have a total depth of 9 ft. 6 in., are from 7 ft. 3 in. to 7 ft. 6 in. long, and taper from top to bottom, the width being 11 in. When assembled they are 21 in. between centers. The ends are made semi-circular.

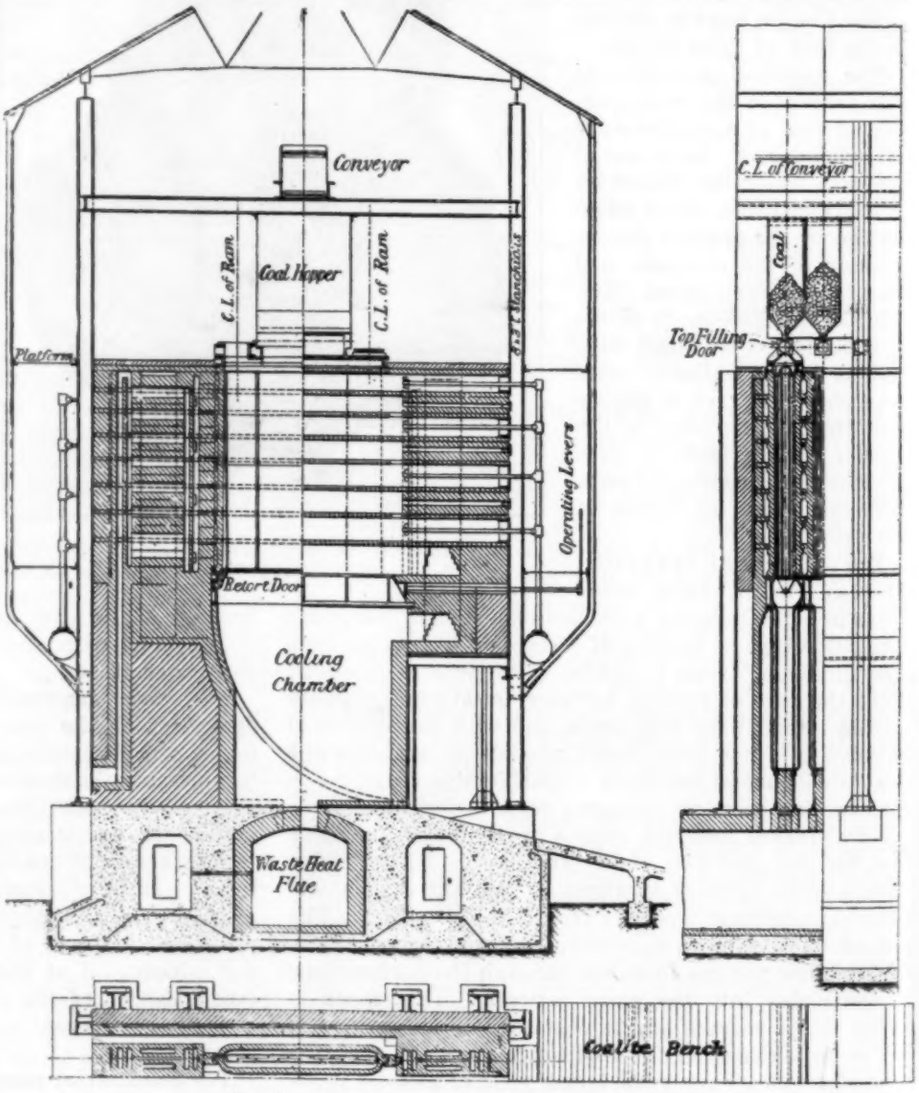
Each retort is mounted on a cast-iron casing incorporating a rocking cylindrical valve which supports the charge, the valve being operated by an external lever. The door spindles are constructed of tubing into which water is fed slowly, an overflow device preventing it from rising to the door level. The steam escapes through holes in the door plate. The action of the steam on the coal results in an increased ammonia yield.

The collapsible plates inside the retort which permit the gas to escape and facilitate the easy discharge of the fuel into the cooler were referred to at the beginning of this article. These plates are constructed of hard manganese cast iron so as to withstand the carbonization gases. These plates are suspended from a bridge piece which can be oscillated by means of a wrench inserted through the manhole on top of the retort. The wrench engages with a castellated collar, keyed to the end of the bridge spindle. This bridge spindle is carried in cast-iron bearings which are only supported, so that the whole of the plate structure, including bridge and bearings, can be withdrawn through the top of the retort.

Each plate is constructed in three parts, merely for convenience in fabrication, the three parts being bolted together so that the complete plate is 9 ft. 6 in. long and 6 ft. 5 in. wide.

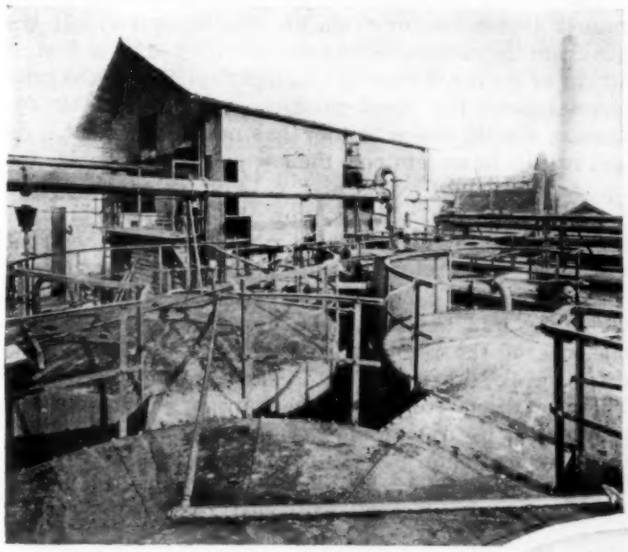
During charging and carbonization the tops of the two plates are level; the bridge piece is horizontal and prevents the charged coal from falling into the space between the plates. The coal is thus deflected and fills the spaces between the plates and the walls of the retort. These plates are held apart by flange abutments as long as the plates are level. At the bottom pair of abutments the plates are connected by links so as to hold them at the correct distance. The space between the plates is then about 4 in. In effect, then, the coal is carbonized in two vertical slabs, 9 ft. 6 in. high, 6 ft. 5 in. wide and about 3½ in. thick.

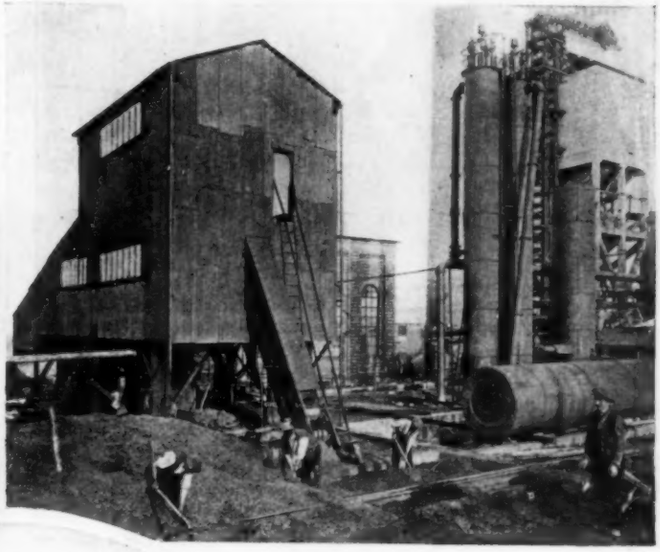
When the retort is to be discharged the bridge piece is rocked over by the wrench. One plate rises and the



Section through retort and cooling chamber

Coalite Low-Temperature Carbonization Plant at Barnsley, England

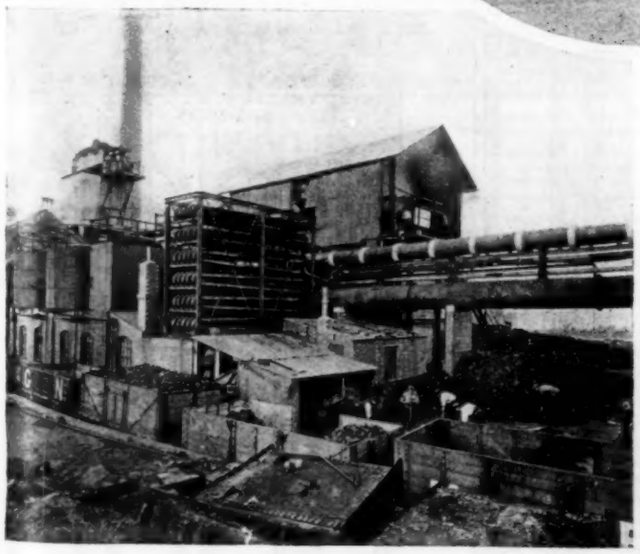




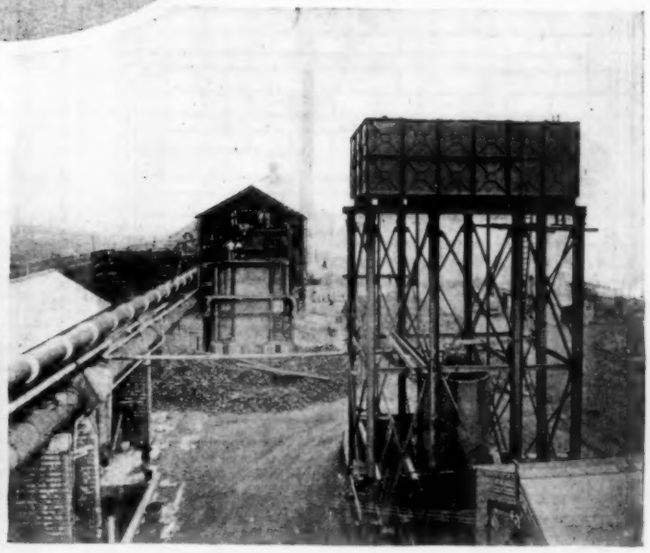
Above, left—Retort house in foreground and storage tanks in background.

Above, right—Coal washer and benzol scrubbers. Men shoeveling raw fuel in foreground.

Center—Dump of Coalite low-temperature coke outside the retort house. Hopper gallery on top, retort bench in middle; cooling chambers with doors for extracting the residual fuel can be seen below.



Gas cooler, storage tanks and retort house



20-in. concrete gas main to retort house

Raking the cooled residual fuel out of the cooling chambers

other falls, the abutments slide past each other, and the pin joints at top and bottom bring the two plates together. The result is that the space occupied by the plates is reduced from 5 to 3 in. and the fuel can fall easily into the cooler.

The rotary valve at the bottom of the retort is opened and the fall into the cooler breaks the slabs into pieces 2 or 3 ft. across. The cooling chamber is constructed of sheet steel and water-jacketed, the sides being connected by a curved steel back. Thin vertical plates are fitted in the center of the jackets so that the water is divided into two sections. The water nearer the charge rises as it heats and is replaced by the cooler water, thus enabling continuous circulation. Steam is thus generated in these jackets at a pressure of about 5 lb. This steam is employed in the producer plant or for fractionating the oils.

The Coalite is allowed to remain in the cooler until the next retort charge is ready, when the vertical cast-iron doors of the cooler are opened by a half turn on the handwheel and the fuel is raked out. The doors are made air- and gas-tight by providing them with a ridge which sinks into an asbestos-filled groove round the door frame.

How the Retorts Are Heated

The retorts are heated by gas either generated by the retorts themselves or from an outside source. If the gas from the carbonized charge is employed, it is first of all rid of its tar, ammonia and light spirit. In the commercial plant the Mond producer is also available for heating should the generator gas not be sufficient. As will readily be understood, the low yield of gas inside the retort is balanced by its high calorific value.

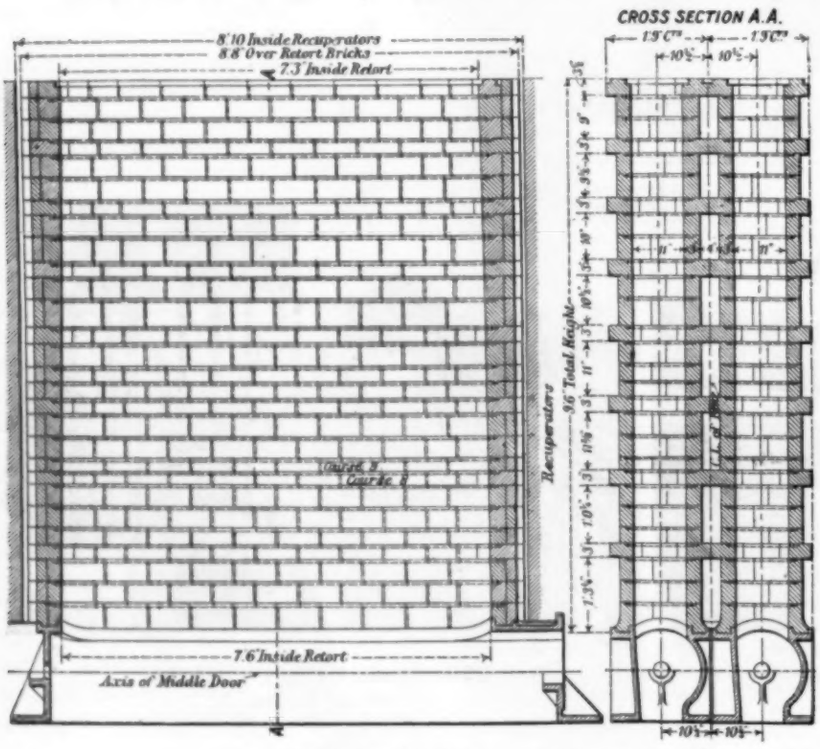
The washed gas, which is stored in holders, is brought to the retorts by mains which run along both the front and back of the retort bench. Vertical pipes are led off these mains and carry the gas to small horizontal pipes which are laid inside the settings. The result is that one side of the retort is heated by the gas from one main and the other side by the gas from the other main. The heated gas from the upper burner passes horizontally across the retort and through a damper down into the next horizontal passage, and zigzags until it passes into the regenerator. A damper is fitted to the end of each passage so that it can be operated from the front of the setting.

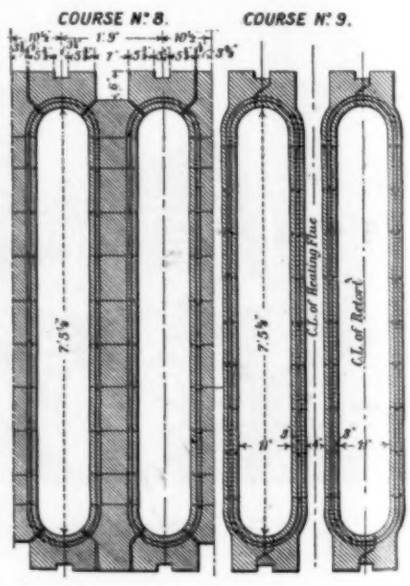
The charge is made up of 70 parts non-coking to 30 parts coking slack. The coking slack is 8 to 9 per cent ash, and the the non-coking 15 to 20 per cent ash. The analyses are as follows:

	Coking Washed Slack, Per Cent	Non-Coking Washed Slack, Per Cent	Coalite, Per Cent
Volatile matter	34.0	36.4	10.0
Fixed carbon	61.1	58.5	83.6
Ash	4.9	5.1	6.4

The 12-cwt. charge (1,344 lb.) yields around 970 lb. salable Coalite containing a maximum of 4 per cent breeze.

The fuel produced by the Coalite process is a kind of semi-coke containing 9 to 10 per cent volatiles, or around





Section through retort settings, showing arrangement of brickwork

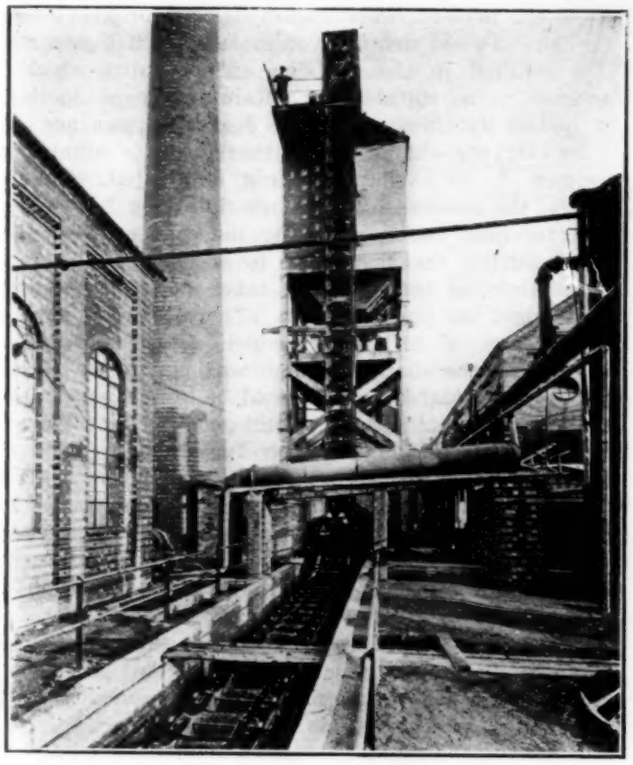
one-third of the volatile matter in the original coal. The Coalite is hard, crisp and porous and can be handled and transported with a lower breakage rate than coal. The fuel is clean and looks not unlike semi-fired small coal sintered in slabs.

When placed in an ordinary domestic grate it ignites very easily, burning with a cheerful glow and giving off a powerful radiant heat without a trace of smoke. It does not dry the air and gives off absolutely no odor.

The radiant efficiency of Coalite in an ordinary open household grate amounts to 35 per cent against 20 to 25 per cent for coal.

Byproducts Yielded by the Process

The tar produced by the Coalite process is not unlike crude petroleum to look at, and it is so different from gasworks and metallurgical coke tar that it should not



The slack coal after washing being carried by gravity bucket conveyor to the retort-filling hoppers

really be spoken of as tar at all. At 60 deg. F. it has a specific gravity of 1.06, against 1.18 for gasworks tar. Its free carbon content is under 1 per cent, compared with gas tar at 6 per cent.

The byproduct yield is higher than from gasworks, and includes benzol, toluol, xylol, solvent naphtha, heavy naphtha, phenol (carbolic acid), cresylic acid, creosote oil and pitch. The low-temperature tar is less rich in carbolic acid than high-temperature tar, though the proportion of cresylic acid is very much higher. It is far less viscous than gas tar and is free from carbon.

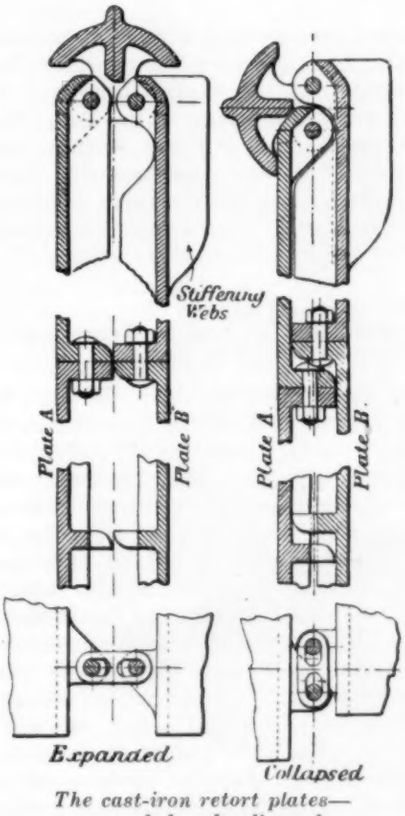
According to Prof. Henry E. Armstrong, it is safe, in the first instance, to value the raw low-temperature oil simply as a liquid fuel. Aside from cresol, which is easily extracted by alkali, it contains none of the constituents of ordinary coal tar, which gives its special value. In a practical test made by the British Admiralty the oil was found to be well within the specification in use for oil fuels. The yield of motor spirit per ton is

Showing how slack coal is charged into the retorts by manipulation of a hand lever. Hoppers overhead containing the slack are numbered to correspond with the retorts below

around 3 gal. Fractions at the various temperatures work out as follows:

Temperature Centigrade	Fraction
170	4.5
210	15.3
240	14.2
300	23.0
Pitch	43.0
	100.0

The entire fraction up to 300 deg. C. can be employed



The cast-iron retort plates—expanded and collapsed

in a cold-starting oil engine, and shows a consumption of 0.49 lb. per b.hp. at the most economical load.

The "balance sheet" of the process is shown in the table:

YIELD FROM ONE TON OF AVERAGE COAL (SAY 25/30% VOLATILE MATTER)

	"Coalite" Process Of Low-Temperature Carbonization.	High-Temperature Gas Works	Carbonisation Coke Ovens
Temperature of carbonization...	1,000 deg. F.	About 1,800 deg. F.	About 1,800 deg. F.
Gas.....	6,000-6,500 cu.ft. rich gas, 700-750 B.t.u. per cu.ft.	12,000 cu.ft. of medium quality (Town's) gas 550 B.t.u. per cu.ft.	11,500 cu.ft. poor quality coke-oven gas, 450 B.t.u. per cu.ft.
Liquid.....	20 gal. Coalite oil fractionated to, say, 3 gal. motor spirit, 8-9 gal. Diesel or fuel oil, and 8-9 gal. lubricating oil	10 gal. coal tar Fractionated to about ½ gal. motor spirit, carbolic acid, a large amount of naphthalene, fuel, oil, etc.	8 gal. coal tar
Sulphate of ammonia (from the ammonia)...	15 lb.	25 lb.	28 lb.
Residue in retort..	14 cwt. smokeless fuel, Coalite containing about 9-10% volatile matter	13½ cwt. soft coke, containing about 1% volatile matter	14-14½ cwt. hard coke, containing less than ½% volatile matter.

The heat employed to carbonize coal by the Coalite process is as 2½ to 3 for high-temperature carbonization.

The output of Coalite at the Barnsley plant has never been equal to the demand. At the present moment other low-temperature carbonization plants are nearing completion and a constant stream of inquiries seems to indicate that a gradual spread of depots for the output of Coalite may be looked for. Probably the ideal use for these plants would be their establishment at pit heads so that the waste coal and breeze, now often neglected, could be turned into solid fuel. It is estimated that as much as 25 to 30 per cent of the coal mined is left in the pits.

The recent arrangement arrived at between the Tully Gas Plants, Ltd., and Low-Temperature Carbonization, Ltd. (operator of the Coalite process), whereby the latter has granted a license to the Tully concern to use its rights and patents in Great Britain, has made possible a union of the two processes—the cheap gas from the Tully plant being used to carry out the process for the manufacture of smokeless fuel and the other products of the low-temperature method.

Glycerine Used as Seal in Temporary Storage of Hydrogen

One of the difficulties which the Bureau of Standards has encountered in the liquefaction of hydrogen is the securing of hydrogen of sufficient purity. If other gases are present, they become frozen at a temperature higher than that at which hydrogen liquefies. This clogs up the apparatus and stops the process. The storing of hydrogen in any kind of a gas holder is, therefore, a matter of some difficulty because gases are very apt to diffuse through the liquid seal used in the holder and become mixed with the hydrogen.

Experiments were made during the past month on the relative rates of diffusion of nitrogen through glycerine, machine oil and water. It was found that the rate of diffusion through glycerine is very much lower than through water or machine oil. This was to be expected because of the extremely low solubilities of nitrogen and other gases in glycerine. The bureau now proposes to employ glycerine as a seal for the gas holder used for the temporary storage of pure hydrogen.

The Thermal Conductivity Of Liquids

A Report on Some Recent Investigations of This Important Subject

In the August issue of *Mechanical Engineering*, F. L. Kallam of Long Beach, Calif., reports at some length on a recent study which he has made of the thermal conductivity of liquids. While this study is not yet completed, the tentative conclusions reached are of considerable interest. The report says in part:

Although the thermal conductivity of liquids has been for a long time a favorite field of research for the physicist, it is still in a very undeveloped and unsatisfactory state. The subject is of profound importance in dealing with problems of heat engineering, and while the present investigation has not progressed far enough to yield definite conclusions, it has nevertheless resulted in the devising of apparatus which is believed to be suitable for obtaining the conductivity of liquids within a reasonable degree of accuracy.

In carrying out the work there were a number of sources of error that were not eliminated. For instance, the results should be multiplied by 1.16 to correct for heat losses, assuming the condensate method of measuring the heat input to be correct. There is uncertainty as to just what takes place between the heater and the liquid surface. Thermocouples indicate a condition of turbulence, which would lead to the belief that the surface contact was not good. If this were so, considerable heat would be lost in penetrating the pocketed air space. With good surface contact, another factor might enter into the problem. With the top water layers at higher temperatures than the bottom ones, imperfect or unequal expansion would take place. This would tend to increase the pressure within the liquid and might be a source of convection currents. Also, with continuous heating, the temperature of the bottom layers could not be brought to the temperature of the top layers, and this is an indication that heat was leaving through the bottom of the vat or that the water-logged vat became finally a better conductor than the vat.

Notwithstanding these sources of error, a number of tentative conclusions may be drawn. On the whole, the conductivity seems to vary with the temperature. Two curious things are noticeable, the conductivities for the same temperature gradient $(T_1 - T_2)/L$ lie upon a straight line, and the conductivities themselves vary greatly for the same temperatures. Thus at 130 deg. F., K is found to be 1.5 and also 4.15. Experimental error may be responsible for this peculiar phenomenon, but in the opinion of the author K depends upon the temperature gradient and not upon the average temperature.

The foregoing conclusions are purely tentative, and the author believes that the subject must be investigated more carefully and with better-constructed apparatus. A container of bakelite might be used. Some means should be available for keeping $(T_1 - T_2)/L$ constant. The source of heat should be of greater intensity than that afforded by steam, so that a greater quantity could be supplied in a given time. Control of the surface contact would be an advantage. Means of measuring the heat passing each section, if one could be devised, would settle the great difficulty of obtaining the flow rate.

Machinery and Appliances for Production and Control

Equipment News

From Maker and User

Materials and Accessories for Chemical Industries

Elevating Platform Truck

The final member of the "K" series of industrial trucks and tractors to be announced at this time is "K-22," an elevating platform truck. The Yale & Towne Mfg. Co., of Stamford, Conn, has combined in this truck the functions of a tiering truck and a low lift truck, because the tiering feature adds but little to the cost and users of lift trucks have the added advantage of this high lift should it be needed. The tiering feature, which permits the transportation and stacking of goods without rehandling, is in many industries the most necessary of truck operations. In other places, the truck can be used as a low lift truck for transporting load skid platforms more efficiently than is possible with the ordinary hand lift trucks so universally employed.

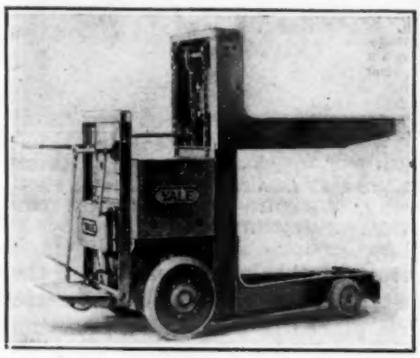
The interchangeability of parts which characterizes this "K" series of trucks is embodied in the elevating platform truck. Most of the parts, units and sub-assemblies are standard and interchangeable with the other models in the series. This is advantageous when several of the series are employed in one plant. And it permits the manufacturer to employ mass production methods, which are reflected in the low selling price of the trucks.

The lifting and lowering mechanism is electrically controlled and is of the triple, spur gear reduction type familiar in the well-known chain hoists made by this company. The strength and efficiency of the lifting unit are the result of many years' experience in the design and manufacture of such hoists. The whole hoisting unit, including the chain and sheaves, is made in accordance with the standards established in chain-hoist making.

Among the specifications of this truck we mention the following:

Capacity—Rated capacity, 4,000 lb.

Weights—Weight of truck less battery, 2,550 lb.; weight of truck with Exide battery, 3,300 lb.; weight of truck with Edison battery, 3,150 lb.



YALE K-22 ELEVATING PLATFORM TRUCK

Dimensions—Wheel base, 55 in.; wheel tread, front, 33¾ in.; rear, 13 in.; length overall, 106 in.; height overall, 83 in.; platform space, length 54 in., width 27 in.—25½ in.; space 10 sq.ft.; platform height, low position, 11 in., high position, 61 in.; ground clearance, 3¼ in.

Steering—Turning radius outside edge of truck, 90 in.; turning radius inside edge of truck, 39 in.; intersecting aisles, 60 in. Four wheel steer hand lever with vertical movement. Hardened and ground steel pins and bronze bushings at all bearing points.

Electrical — Drive motor — series wound, totally inclosed. 36 volt. 45 amp. 18 r.p.m. continuous rating. Hoist motor—wound, totally inclosed. Wired for regenerative braking when lowering platform. Battery—Exide Iron Clad or Edison. Main controller—Yale drum type with renewable arcing contact and cutout switch. Three speeds forward and reverse. Hoist controller —Yale drum type with automatic throw-out when platform reaches high and low position. Wiring—No. 2 rubber covered acidproof. Battery connector — Yale quick detachable type. Resistor—Yale cast grid type. Charging plug — Yale quick detachable type same as battery connector.

Structural — Frame — Pressed steel, main longitudinal members, one piece. Drive unit—Double reduction spur gear 18.7 to 1; mounted on ball bearings. Full floating axle shaft driving wheels through enclosed ball joints. Hoist unit—Triple reduction spur gear 105 to 1 inclosed in housing driving Yale heat-treated chain over hardened sheaves. Wheels—Pressed steel, disk type. Wheel bearings—Single deep groove type ball bearing. Tires — Solid rubber, 20 x 3½ in. front wheels, 10½ x 5 in. rear wheels, pressed on type. Springs—Two helical coiled spings on front end, maximum deflection 2 in. Brake—External contracting double shoe type on motor shaft. Brake on hoist mechanism — External contracting double show type on motor shaft interconnected with hoist controller.

Speed — Speed empty, level concrete, maximum, 8 miles per hour; Speed loaded, 4,000 lb. level concrete, maximum, 6¼ miles per hour; Speed 10 per cent grade, 4,000 lb. load, 2 miles per hour; acceleration, full speed in 60 ft.; hoisting speed, empty, 4½ in. per second; hoisting speed, loaded 4,000 lb., maximum, 2 in. per second; lowering speed, all loads, 4¾ in. per second maximum, controlled by regenerative action of hoisting motor.

General — Lubrication, high pressure, grease gun. Alarm signal, Yale gong, foot operated plunger. Coupler, Yale pin and socket type.

A Hoist for Use Where Headroom Governs

There are many places, especially in manufacturing buildings, where the nature of the work makes the

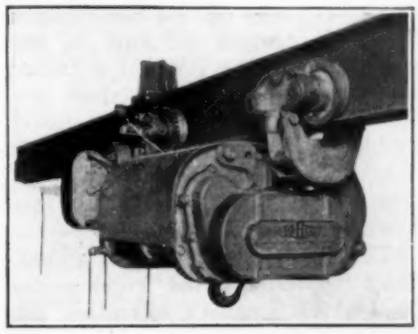


FIG. 1.—3-TON "LO-HED" HOIST, MOTOR-DRIVEN TROLLEY, FLOOR OPERATED.

use of an electric hoist desirable. Often, however, the headroom available will not permit the use of these labor savers, as the load cannot be lifted to a sufficient height to clear obstructions. This is primarily due to the amount of space that is needed between the bottom of the supporting beam and the hoist hook.

As a means of overcoming some of these difficulties and extending the usefulness of electric hoists, the American Engineering Co., of Philadelphia, Pa., has designed and is now marketing a hoist which is called the "Lo-Hed" hoist. This hoist has a headroom requirement of 10 in. for the 1-ton size and 14 in. for the 3-ton size. According to the manufacturers, this is from 2½ ft. to 4 ft. less than the space under the monorail track required by any other hoist of equal capacity on the market.

This hoist comes in various sizes, ranging from ½ ton to 6 tons in capacity. The types include with and without trolley, floor operated; hand geared, floor operated; motor driven, floor and cage operated. They are built for a.c. and d.c. current as desired and operate on standard I-beams, around curves or through switches. The makers claim that these hoists are simple, rugged and safe, and will meet all requirements.

FIG. 2.—1½-TON "LO-HED" HOIST HANDLING LEATHER IN LARGE TANNERY. HEADROOM—8 FT. FROM TOP OF TANK TO CEILING.

A Glass Pipe Joint

With the idea of providing a simple form of joint for building up glass pipe lines, the Corning Glass Works, of Corning, N. Y., has placed on the market the "Pyrex" pipe line joint shown by the accompanying illustration.

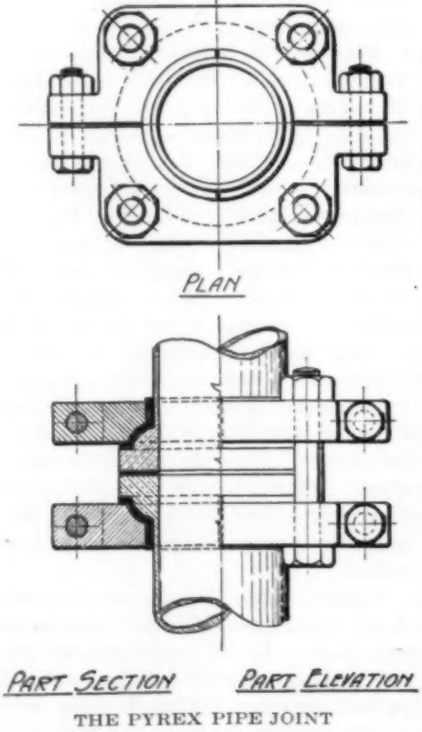
As can be seen in the cut, the adjacent ends of the glass pipe are flanged and are provided with specially designed reinforcements, so shaped that the major stress of the bolting flanges comes on the reinforcements. The bolting flange proper consists of two metal parts. These fit around the end of the glass pipe in the form of a collar, the pipe being separated and protected from the metal by a heavy molded rubber gasket, shaped to fit the reinforcements in the pipe. This is shown in the cut by the heavy black irregular line.

This heavy gasket acts as a cushion, distributing the compression load which is caused when the bolts that hold the two parts of the metal flange together are taken up.

When the joint between two pieces of this pipe is made up, the metal flanges mentioned above are first placed in position with a thin gasket of some suitable material between them. The nature of this gasket will depend on the liquid which the pipe is to convey.

While this development is new, the manufacturers state that the lines which have already been put in service are showing up well. They believe that this device will prove to be the solution of joining up the smaller sizes of glass pipe so they can be used for pumping lines, for regular acid-conveying lines and for the passage of corrosive gases.

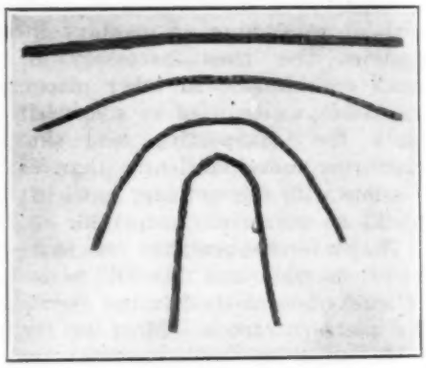
The metal flanges at present in use are made of aluminum. One advantage of the split construction of these flanges is that a section of pipe can be readily removed and another put in its place, the same metal flanges being used. The makers point out that glass pipe lines with this type of joint are useful not only from the chemical manufacturing standpoint but also in various industries where purity of the final product is of prime importance, as in the manufacture of food products.



THE PYREX PIPE JOINT

A Sulphur Torch for Detecting Leaks

Until recently, sulphur torches have consisted of pieces of cardboard dipped in sulphur, or of twine similarly treated. Several months ago the White Tar Co., of 56 Vesey St., New York City, placed on the market a so-called white tar trouble torch.



WHITE TAR TROUBLE TORCHES SHOWING HOW THEY CAN BE BENT

This torch consists of a strand of light twisted wire having cotton fibers so distributed through its strands as to make a short strip about 7 in. in length and ☆ in. in diameter in which the wires are completely covered and hidden by the sulphur impregnated cotton fibers.

It is claimed that this new torch has advantages over the former torches on the market. The impregnated cardboard strips were likely to crack off with handling, and when ignited dropped burning sulphur on the surrounding objects.

Among the uses of this taper are suggested the detecting of leaks in ammonia lines, the igniting of all forms of sulphur, whether used in pans or large industrial burners, and the sulphuring of barrels where a number of these tapers may be bent into the shape of a hairpin and hung through the eye of a piece of wire which is lowered through the bung of the barrel.

Review of Recent Patents

Developments of Interest to Metallurgists

Electric-Furnace Melting of Manganese Scrap—Hints on Carburizing and Blast Furnace Details Among Current Inventions

THE ADVANTAGE has long been recognized of melting manganese steel in a furnace in which the necessary temperature is developed by the electric arc, because of the ready control of temperature by the mere regulation of electric current dimensions, and the preservation of the readily oxidizable manganese element which is afforded by the relatively inert bath-environment which such a furnace insures. In patent 1,291,656, issued January 14th, 1919, Wesley G. Nichols, of Chicago, described a method of recovering manganese steel from scrap, in which the manganese content is further safeguarded by proceeding cautiously during the protracted period heretofore considered necessary in bringing the bath to the fusing point, and insuring against the increase of temperature at the arcing point more rapidly than the recognized relatively low conductivity of the manganese steel would permit of its assimilation or distribution throughout the whole mass, and thereby avoiding the burning of the manganese out of the surface of a piece of scrap before its interior reaches the fusing point; precautions being taken, upon nearing the temperature at which the scrap becomes mushy and breaks down, say about 2200 deg. F., to supply a basic slag protection, and care being taken to keep the bath down to the fusing point (about 2400 deg. F.) unless and until, for the sake of pouring, it becomes necessary to run the temperature up for a brief period to avoid freezing in the ladle.

Mr. Nichols has now found that temperature alone does not necessarily consume the manganese but the element of time is also important. Accordingly the improved procedure is to charge the desired quantity of manganese scrap into an electric furnace, either cold or while still hot from a previous heat (after cleaning out and making necessary repairs to the lining), adjust the electrodes, and then, instead of delivering a wattage of say one-half or less of furnace capacity and slowly working up to the melting point, supply at once a wattage up to the furnace limit, for instance in a three ton furnace about 2,000 kw. and in a six ton furnace about 3000 kw., and maintain this high wattage until complete fusion is attained. By applying the limit wattage from the beginning a very hot arc is produced, and the fusing point is attained throughout the bath, in a very short time, say from one to two hours time instead of in from four to six hours, as heretofore, and serious oxidation will not have been incurred. (1,460,106, assigned to American Manganese Steel Co.; June 26, 1923.)

Carburizing Only One Surface of Hollow Articles

Heretofore, when it has been desired to harden only the inner or the outer surface of a hollow article, it has been common practice to coat one surface with a varnish or other compound that would not interfere with cementation or carburizing, and then dip the article thus coated into a solution of copper for the purpose of coating with copper the unvarnished portion and thereby protecting such copper-coated portion against carburization when the article is packed and heated in the presence of the carburizing material.

Both of these preliminary treatments are eliminated in a method described by Harry W. McQuaid, of Canton, Ohio, in Patent 1,459,409, issued June 19, 1923, and assigned to Timken Roller Bearing Co. Articles such as the inner cones of roller bearings which require carburizing only on the outer surface are assembled axially in the form of a sectional tube of convenient length. The open ends are covered with washers through which is passed a bolt holding the assembly so tight that carburizing gases are excluded from the interior of the assembly. An ingenious modification permits carburizing only the interior of articles such as roller bearing cups.

Cooling Blast Furnace Iron Notch

The wall of the furnace adjacent to and surrounding the iron notch of a blast furnace has usually been protected by means of a cooling plate having means for circulating a cooling fluid therethrough. This plate has however, proved insufficient in practice to prevent the cutting away of the hearth wall adjacent to the notch, such wall being of a thickness too great to permit it to be efficiently cooled by the cooling action of this external cooling plate. Julian Kennedy, of Pittsburgh, Pa., provides supplemental cooling means in the form of wedge-shaped boxes set into the hearth wall between the iron notch and the bosh plate coolers. These boxes extend downwardly and inwardly into the wall in the direction of the iron notch; two being used, one on each side of the vertical center line of the notch. The box is

American Patents Issued July 24, 1923

The following numbers have been selected from the latest available issue of the *Official Gazette* of the United States Patent Office because they appear to have pertinent interest for *Chem. & Met.* readers. They will be studied later by *Chem. & Met.'s* staff, and those which, in our judgment, are most worthy will be published in abstract. It is recognized that we cannot always anticipate our readers' interests and accordingly this advance list is published for the benefit of those who may not care to await our judgment and synopsis.

1,462,485—Method of and Apparatus for Mixing Materials. G. W. Denison, Bay Village, Ohio.

1,462,540—Furnace. A. Festa, Paris, France.

1,462,563—Method of Lubricating Rubber Molds. A. G. Voltz, Cleveland, Ohio.

1,462,576 — Coking of Coal. S. R. Illingworth, Brynfedwen, England, assignor to Illingworth Carbonization Co., Ltd., Manchester, England.

1,462,613—Method of Producing Azo Colors in Non-Aqueous Solvents. W. J. Murray, Boston, Mass., assignor to Arthur D. Little, Inc., Cambridge, Mass.

1,462,621—Apparatus for Drying Material. O. Pfeiffer, Leipzig, Germany.

1,462,649 — Percentage Feeder and Mixer. A. D. MacLellan, Owensboro, Ky., assignor to MacLellan Mixer Co., Owensboro, Ky.

1,462,705—Gas Generator. J. M. Kirby and B. E. Hartson, Boulder, Colo.

1,462,732 — Production of Phosphorus Oxychloride. R. L. Andreau, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

1,462,752 — Carbon Catalyst. C. B. Jacobs, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

1,462,753—Desensitized Explosive. W. H. Ward, Swarthmore, Pa., assignor to E. I. du Pont de Nemours & Co., Wilmington, Del.

1,462,771 — Phenolic Condensation Product. W. O. Snelling, Allentown, Pa.

1,462,840—Method of Determining Free Phosphoric-Acid Content. J. F. Wilkinson, Savannah, Ga.

1,462,851—Process for Utilizing Residual Heat. A. S. Cooper, Santa Barbara, Calif.

1,462,881—Method for Producing Fluid-Separating Mediums and Fluid-Separating Medium Produced Thereby. T. M. Chance, Philadelphia, Pa.

1,462,904—Method of Preparing Bituminous-Cement-Aggregate Composition. S. F. Finley, Atlanta, Ga.

1,462,987—Process for Producing Nitric Acid by Means of the Electric Arc. W. Siebert, Laufenberg, Aargau, Switzerland, assignor to Nitrum Aktiengesellschaft, Zurich, Switzerland.

1,462,991—Building Brick and Process of Making Same. R. L. Taylor, Midway, Pa., assignor, by mesne assignments, of one-half to C. L. McKenzie, Pittsburgh, Pa.

1,463,000—Process of Making Paper Pulp. B. J. Bellinger, Dexter, N. Y.

1,463,037—Process for the Manufacture of Alkali-Metal Silicates. C. Deguide, Enghien, France.

1,463,044-58—Furnace Wall. M. Liptak, St. Paul, Minn., assignor to A. P. Green Fire Brick Co., Mexico, Mo.

1,463,122—Process for Making Turpentine Substitute and Product Therefrom. B. Logan, De Quincy, La., assignor to Acme Products Co., New Orleans, La.

1,463,123—Building-Material Composition. F. J. McAllister, Elyria, Ohio, assignor of one-eighth to A. E. Simmons and one-eighth to F. Henke, both of Elyria, Ohio.

1,463,141-3 — Method of Controlling Combustion. E. H. Brown, Philadelphia, Pa., assignor, by mesne assignments, to Hagan Corporation, Pittsburgh, Pa.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

preferably provided with an interior baffle wall, which is so placed as to cause the cold water entering the box to pass downwardly to a point near the lower end of the box, before escaping into the main chamber of the box. Preferably, this baffle wall will be provided with one or more small openings at its extreme upper portion, so as to permit of the escape of any steam. 1,460,065; June 26, 1923.

Improved Checkerwork for Hot-Blast Stoves

If, instead of having the vertical checkerwork flues in a hot-blast stove of uniform cross-section throughout, the cross-section increases toward the top of the checkerwork, it is evident that the stove will be able to function for a longer time before the flues become clogged with dust. Fred E. Kling, of Youngstown, Ohio, claims to obtain this desirable result by diminishing the thickness of the walls of the checkerwork near the top. In addition the combustion chamber of the stove is surmounted with horizontal checkerwork flues which act as baffles to reduce the amount of dust carried along to the vertical flues and also cause a more uniform distribution of the gases through the latter. (1,461,357; July 10, 1923.)

Addition Agent for Pickling Baths

Addition of about 1 per cent of chinoline or a chinoline derivative to pickling baths is claimed to prevent brittleness in the articles pickled. (1,460,395; Otto Vogel, of Dusseldorf-Oberkassel, Germany; July 3, 1923.)

Cooling Flue Gases

To facilitate construction, control and cleaning of flue gas coolers, Howard H. Utley, of Florence, Colo., has devised a system of pipe cooling units disposed crosswise of the furnace flue, in which the inlet pipes of the units have flexible connections, preferably in the form of short sections of hose, with water headers or drums which communicate with a suitable source of water supply. A separate header is preferably provided for every four or five units.

With this arrangement, the water control of each cooling unit is independent, and each individual unit of the cooling system can be removed or changed without disturbing the remaining units. The flexible connections between the inlet pipe sections and the headers permit the expansion and contraction of the units without interrupting or disturbing the flow of water to and from said units. These flexible connections also permit movement of the pipe sections bodily without interrupting the flow of water therethrough whereby the ends of the pipes may be raised and dropped for cleaning purposes, the jar resulting from the dropping of the pipe sections tending to shake off most of the matter which is deposited thereon. (1,460,872, assigned to River Smelting and Refining Co.; July 3, 1923.)

Book Reviews

Advanced Organic Laboratory Manual

AN ADVANCED LABORATORY MANUAL OF ORGANIC CHEMISTRY. By *Michael Heidelberger*, Associate in Chemistry, Rockefeller Institute for Medical Research. 103 pages. New York: The Chemical Catalog Co. Price, $2.

This little book is designed to serve as the foundation of an advanced course in organic chemical preparations. The detailed directions for the preparation of nearly forty substances are divided into nine chapters, each dealing with some important organic reaction or group of special compounds. The choice of material is varied and interesting; one finds, for example, procedures for preparing crystalline egg albumin, veronal, Meldola's blue, beta glucose penta-acetate, arsphenamine, dihydrocupreine and methyl anthranilate. The technique of such operations as catalytic reduction (at room temperature), the separation of optical isomers, the separation of isomeric benzene derivations and the "mercuration" of aromatic compounds are illustrated by suitable examples.

The book is clearly and interestingly written, though one might wish in places for a somewhat more ample discussion of the reasons for each step in the procedure and for certain theoretical implications of the work. However, the numerous references to the original literature should be a guide to the advanced student in quest of further information; moreover, supplementary reading and lectures would presumably accompany this series of laboratory exercises and supply the necessary broad background of organic chemistry.

The author rather apologizes in the preface for including so many experiments chosen from his own and his associates' work. In the opinion of the reviewer this practice is excellent, as it is a splendid guarantee that the author has had much personal experience with the preparations and has not merely collected them from the literature without a critical laboratory examination. One consequently gets the impression in reading this book that it is a real laboratory manual which the author has tested and found entirely adequate and recommends on this basis to his fellow chemists and their students. If this were only true of all manuals, what a different place the organic chemical laboratory would be!

J. B. CONANT.

Experimental Technique of Ultra-Violet Production

ULTRA-VIOLET RADIATION — Its Properties. Production Measurement, and Applications. By *M. Luckiesh*, Director of Applied Science, Nela Research Laboratories, National Lamp Works. D. Van Nostrand Co., New York, 1922. Price, $3.50.

This book continues the author's series of lucid expositions of special topics in light. Written with the same

Important Articles in Current Literature

More than fifty industrial, technical or scientific periodicals and trade papers are reviewed regularly by the staff of *Chem. & Met.* The articles listed below have been selected from these publications because they represent the most conspicuous themes in contemporary literature, and consequently should be of considerable interest to our readers. A brief résumé of each article is included in the reference given. Since it is frequently impossible to prepare a satisfactory abstract of an article, this list will enable our readers to keep abreast of current literature and direct their reading to advantage. The magazines reviewed have all been received within a fortnight of our publication date.

STRENGTH OF STEEL AT HIGH TEMPERATURES. H. J. French and W. A. Tucker. A comparison of carbon and alloy steels, showing the effect of carbon content and heat treatment on plain steels. *Iron Age*, July 26, 1923, pp. 193-195.

COAL STORAGE AT THE ROBERT GAIR COMPANY PLANT. J. A. Beck. A description of a drag scraper installation successfully used by a paper manufacturer. *Management and Administration*, August, 1923, pp. 200-202.

TRAINING TECHNICAL MEN FOR THE PAPER INDUSTRY. C. E. Libby. A detailed description of the facilities offered at the New York State College of Forestry in preparing men for practical positions in the paper and pulp mills of the country. *Paper Trade Journal*, July 26, 1923, pp. 49-52.

AUTOMATIC MIXING AND REFINING. B. W. Elberson. A short discussion of the use of inclosed machines, such as internal mixers, masticators and strainers in the mixing and refining of rubber stock. *Rubber Age*, July 25, 1923, pp. 304-305.

PROGRESSIVENESS SHOWN IN EQUIPMENT AND MANAGEMENT OF MT. CLEMENS POTTERY. An illustrated description of manufacturing procedure at the Mt. Clemens Pottery Co., Mt. Clemens, Mich. *Ceramic Industry*, July, 1923, pp. 68-72.

FORTY YEARS MAKING ORNAMENTAL GLASS. Covers the plant of the Peltier Glass Co., at Ottawa, Ill. *Ceramic Industry*, July, 1923, pp. 85-87.

CONSTRUCTION AND OPERATION FEATURES OF THE RO-MACK ENAMEL FURNACE. C. A. Hahn. Intermittent type oil-fired furnace with no muffle or separate combustion chamber. *Ceramic Industry*, July, 1923, pp. 88-89.

STORAGE AND NOVEL WATER SYSTEM AT PHOSPHATE PLANT. American Agricultural Chemical Co. at Pierce, Fla., has concrete storage bins of 45,000 tons capacity and a water system which affords continuous use of the same water. *Rock Products*, July 14, 1923, pp. 27-32.

THE COLORING OF METALS. Alexander E. Tucker. An interesting series of processes for coloring iron and copper work without the use of metallic salts. *J. Soc. Chem. Ind.*, July 13, 1923, pp. 299T-302T.

THE USE OF ACETONE IN COMPOSITE ENGINE-FUELS. R. F. Remler. An excellent blending agent, reduces detonation, miscible in all proportions with various other motor fuels and an economical means of adding dissolved acetylene to a fuel. *J. Soc. Automotive Ind.*, July, 1923.

clarity and popular appeal which characterizes its predecessors, it is, however, more directly addressed to the man in the laboratory, as its sub-title indicates, and is primarily a reference work on the experimental technique of ultra-violet production and utilization. No theoretical material is included, but the entire literature has been reviewed for established facts. No less than 510 original references are given at the close of the various chapters. The result is more a catalog than an interpretative summary and in this sense it falls short of the standard set by Plotnikow, whose German book is throughout illumined by his own vast experience in the field.

The chapter headings are: solar radiation, transparency of gases, transparency of liquids, transparency of solids, transparency of glasses, reflection of ultra-violet radiation, ultra-violet radiation in common illuminants, experimental sources, detection and measurement, effects upon living matter, and various photochemical effects. The chapter on glasses is of particular practical interest and that on reflection is a unique presentation. The work abounds with stimulating suggestions for the laboratory man. The use of the unit μ throughout in place of the common $\mu\mu$ or Angström unit may be confusing but is a distinct and welcome advance.

For the wisely limited field no better summary is available in English. As in the other volumes of the series, the printing and illustrations are admirable and add much value.

G. L. WENDT.

Review of Low-Temperature Carbonization

LOW-TEMPERATURE CARBONIZATION OF BITUMINOUS COAL. By *Andrew McCulloch* and *Neville Simpkin*. 248 pages. H. F. and G. Witherby, London, 1923. 18s., net.

To have prepared a finished and complete volume on low-temperature carbonization of coal would have been impossible for these or any other authors, because this engineering art is in its infancy. But this book comes at a time when there is great interest in this developing industry and it will serve as a very helpful reference work and guide to investigators and to engineers who are seeking further improvements in the methods and equipment for low-temperature processing of coals. Written from a distinctly British point of view, the work, of course, gives greatest attention to British methods; but a very creditable report is given of some of the American work, particularly the studies of the Carbocoal process.

The authors evidently realized that it was not desirable to make an appraisal of the relative merits of the various processes, either those known to them personally or those developed in other countries. They very wisely have contented themselves with a discussion of each process, its achievements, its present status and a limited discussion of its advantages and difficulties. They have not undertaken to discuss except in a most general way the relative commercial opportunities of any.

Some might say that more detail regarding those processes that have been discussed would have been desirable. But the authors can be forgiven for the limited amount of information furnished, if for no other reason than that in many cases further detail is not worth anything to anyone except the investigator of the individual process itself. In fact for most of the processes considered there has already been demonstrated such complete lack of promise as not to justify further study, except as a warning against pitfalls already discovered by the pioneer effort involved in these failures.

It is very noticeable that the authors lay great emphasis throughout the book on the advantages of smoke abatement from use of coke rather than coal in industrial and domestic heating. From the standpoint of an engineer interested in low-temperature carbonization, the greatest fault is the somewhat excessive space given to this phase of the subject. Nevertheless the authors have rendered a real service in emphasizing the economic and general advantages of further development in this industry. On this score alone the attention given to smoke abatement is amply justified. And the authors are to be complimented not alone on this service but also upon the well-balanced and conservative appraisal they give to the industry. They have done well to make it clear that encouragement should be given, but at once to warn against undue optimism regarding the immediate financial opportunities to be expected in this field. Anyone interested in either financial or technical phases of low-temperature processing of coal will do well to study the book carefully.

R. S. MCBRIDE.

Hints for Technical Writers

NOTES ON THE COMPOSITION OF SCIENTIFIC PAPERS. By *Rt. Hon. Sir T. Clifford Allbutt*. 192. pp. Macmillan Co., New York. Price, $2.40.

It is a happy circumstance for Great Britain that so many who are nationally eminent in sundry walks of life there should have the scientific bent. To such, clarity in literary presentation is as important as exactness in research. Moreover, it is fortunate for the medical profession that one of the leaders of thought at the University of Cambridge recognized long ago that the average graduate needs advice on the composition of scientific papers. This led to the publication, in 1904, of a booklet of useful comments, advice and hints, which now appears as a third edition. Would that all other "learned" professions had a mentor so capable and willing to help.

The volume now under review was published after an extensive experience with medical theses, the majority of which, we learn, are hard reading and, as received, unsuitable for the printer. However, this criticism applies to almost all immature scientific and technical literary effort. Present-day education is such that it is difficult for the student "to dress his matter so that it flows easily into the mind of the reader." Few realize that "the impression of unstudied ease is a product of the finest pains, of pains unknown to those who are prepared with the stuff but not with the art of letters." The Public Orator at Oxford is quoted as saying: "Students of natural science are beginning to see that the reason why they have been comparatively little in demand for administrative posts is not to be sought in mere jealousy or conservatism, but in the simple fact that many of them have not been trained in the art of making themselves intelligible." And this applies with equal force to the technical worker. The profession of chemistry in America has several notable exponents of the value of clarity and simplicity in technical journalism; its scientific literature is of a high order of excellence. But the rank and file would perhaps welcome a booklet similar to the one under review, but peppered with the technical terms to which they are accustomed, telling them "how it's done."

The inarticulate scientist is as uninteresting as a dumb waiter. The careless writer, on the other hand, is merely the cause of headaches and a feeling of irritation on the part of the reader. Sir Clifford corrects a popular misconception when he says that "knowledge and mental power do not suffice to make a writer. Manifold scholarship does not suffice to make a good writer, nor exact science an exact writer. To those who have taken a lifelong thought how to write, who have striven painfully with the craft of this supreme art, the view of it as a happy gift seems a flippancy. Let the candidate be assured that an easy and interesting style implies hard practice." The advice underlying this comment should be taken to heart by all would-be authors.

Beginnings and endings are usually a source of grief to the inexperienced writer; he will find excellent suggestions at hand. Precision and lucidity are lauded, as they should be. Gaudiness and "style" are criticised. We are reminded that a self-conscious style has been considered by many to be the mark of a second-rate thinker.

The second and final chapter discusses composition, and contains many valuable hints to technical and scientific writers, administered in pleasant and readable form. A final section deals with punctuation.

The book under review contains so much excellent advice that it is impossible to select sufficient extracts to indicate its value. A few "tabloid" suggestions culled from different sections, are as follows:

"Keep down your 'thats'; they multiply like lower organisms."

"Avoid indirectness, as exemplified by sentences beginning with 'There is' or 'There are.'

"Hyphens are rarely wanted." For this opinion we are truly thankful.

"There are few true synonyms in literature, none perhaps."

"Slang, at worst, saves us from the too abstract. 'Up to you' and 'on his own' are quick and effective phrases and may creep into good idiom."

"Many a bad sentence is grammatically correct."

And, lest we aspire to greater heights than we can reach, let us be restrained by the reminder that the art of "felicitous dilution, of graceful digression, of happy amplifications is the last accomplishment of an author; but in scientific essays this quality is less important, perhaps rarely expedient; authors of scientific papers had better be content with the pruning hook. . . . Force, lucidity, unity, simplicity, economy of expression are virtues which we may all attain; originality will be as God pleases."

A. W. ALLEN.

New Publications

NEW DEPARTMENT OF AGRICULTURE PUBLICATIONS: Bull. 1126, The Effect of Borax on the Growth and Yield of Crops, by J. J. Skinner and B. E. Brown, price 15c; Bull. 1147, Chemical, Physical and Insecticidal Properties of Arsenicals, by F. C. Cook, price 10c; Bull. 1149, Absorption and Retention of Hydrocyanic Acid by Fumigated Food Products by E. L. Griffin and I. E. Neifert, price 5c; Bull. 1152, Soy and Related Fermentations, by Margaret B. Church, price 15c; Circular 263, Preliminary Report on Control of San Jose Scale.

THE IMPERIAL MINERAL RESOURCES BUREAU, London, England, has issued in its series The Mineral Industry of the British Empire and Foreign Countries, a pamphlet on Lead, which gives statistics from 1919 to 1921, and one on Zinc.

THE BRITISH ENGINEERING STANDARDS ASSOCIATION, 28 Victoria St., Westminster, London, S.W.1. England, has issued a pamphlet on "Standardization of Cast-Iron Filter Presses," which is a report of the sub-committee for standardization of filter press plates, appointed by the Joint Research Committee on Chemical Plant, the Association of British Chemical Manufacturers and the British Chemical Plant Manufacturers' Association.

THE CENTRAL OF GEORGIA RAILWAY INDUSTRIAL DEPARTMENT, Savannah, Ga., has issued two pamphlets: "Refractory Possibilities of Some Georgia Clays" and "Washing Tests of Georgia Clays," both by R. T. Stull and G. A. Bole.

THE U. S. GEOLOGICAL SURVEY has issued Water-Supply Paper 496 on "The Industrial Utility of Public Water Supplies in the United States," by W. D. Collins.

NEW BUREAU OF STANDARDS PUBLICATIONS: Circ. 139, U. S. Government Specifications for Dry Cells; Circ. 143, Recommended Specification for Quicklime for Use in Causticizing; Tech. Paper 237, Aëronautic Instruments, by Franklin L. Hunt.

THE MELLON INSTITUTE OF INDUSTRIAL RESEARCH of the University of Pittsburgh has issued the first supplement to Bulletin No. 1 in the Institute's Bibliographic Series. This supplement lists three books, three bulletins, nearly eighty journal contributions and twenty-six patents by members of the Institute during the calendar year 1922. The Institute will be glad to furnish copies upon request.

THE BUREAU OF MINES has issued Reports of Investigations, Serial No. 2502, on "The Use of Oxygen or Oxygenated Air in Metallurgical and Allied Processes," by F. W. Davis. It constitutes the report and recommendations of the Committee for the Application of Oxygen or Oxygenated Air covering the processes of iron smelting, steel manufacture, artificial gas production and blast furnace smelting of ferromanganese.

Men in the Profession

WILLIAM H. COVERDALE, a member of the firm of Coverdale & Colpitts, New York, consulting engineers, has been elected chairman of the board of the Pierce Oil Corporation of the same city, succeeding Henry C. Pierce.

FRED C. HAHN, who recently received his doctor's degree at the Johns Hopkins University, is now connected with the research department of E. I. du-Pont deNemours and Co., Deepwater, N. J.

A. T. MCPHERSON, Ph.D. University of Chicago, 1923, has accepted a position as associate chemist in the Bureau of Standards, where he is engaged in the investigation of rubber and gutta percha as insulating materials.

LOWELL H. MILLIGAN, who received the degree of Doctor of Philosophy in chemistry and physics this June at Cornell University, has taken a position as research chemist with the Norton Co., at Worcester, Mass. Dr. Milligan took his undergraduate work in chemical engineering at Ohio State University, and also holds the degree of Master of Science from that Institution. During the early part of the war he was on the war gas investigations of the Bureau of Mines, and later was a lieutenant in the Chemical Warfare Service at Edgewood, Md. For two years previous to his residence at Cornell, he was engaged in research for the Aluminum Co. of America at New Kensington, Pa.

PHILIP L. REED has resigned as treasurer of the Eastern Leather Co., Boston, Mass., to become assistant treasurer of Armour & Co., Chicago.

GEORGE A. REUFF, Ellwood City, Pa., has been appointed general manager of the Seamless Tube Co., McKeesport, Pa., Works, to succeed E. C. Jaycox, deceased.

H. STIRLING SNELL, formerly chief chemist for William Heap and Sons Co., has accepted a position as chemical engineer in the development department of the Western Electric Co., Chicago, Ill.

H. H. SORTWELL, formerly connected with the Bureau of Standards, Washington, D. C., is now located with the Star Porcelain Co., Trenton, N. J.

F. W. SULLIVAN, JR. has resigned from the teaching staff of the chemistry department of the University of Michigan, to do reseach work for the Standard Oil Co. (Indiana) at Caspar, Wyo.

J. F. WISCHHUSEN, president of the Superfos Co., New York, chemical products, has returned from a trip abroad after an absence of more than two months, in which time he has visited England, Italy, Holland, Germany and other countries.

HARRY W. WOLFF and MAX ALPORT are now the sole owners of the stock of the Hirsch Laboratories, Inc. formerly controlled by Drs. Alcan Hirsch and Marx Hirsch. Mr. Wolff had been general manager of the firm since its incorporation in 1920. Mr. Alport has been the research chemist during the same period.

RALPH G. WRIGHT, head of the chemistry department of Rutgers College and the State University of New Jersey, has been granted a year's leave of absence. In September he expects to leave with his family for an extended trip to Europe, returning in September, 1924. Prof. Ernest Little, who has been head of the Summer courses in chemistry at Rutgers for the past five years, will be acting head of the chemistry department during Dr. Wright's absence.

Calendar

AMERICAN CERAMIC SOCIETY, summer meeting, Toledo, Detroit and vicinity, Aug. 8 to 11.

AMERICAN CHEMICAL SOCIETY, fall meeting, Milwaukee, Wis., Sept. 10 to 14.

AMERICAN ELECTROCHEMICAL SOCIETY, forty-fourth meeting, Dayton, Ohio, Sept. 27 to 29.

AMERICAN GAS ASSOCIATION, annual convention, Atlantic City, Oct. 15 to 20.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, INC., Ontario and Quebec, Aug. 20 to 31.

AMERICAN MANAGEMENT ASSOCIATION, Hotel Astor, New York, Oct. 29-31.

AMERICAN MINING CONGRESS, Milwaukee, Wis., Sept. 24 to 27.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, annual meeting, New York City, Dec. 3 to 6.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, annual convention, New York City, Dec. 3 to 5.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS, iron and steel exposition, Buffalo, N. Y., Sept. 24 to 28.

NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATION ENGINEERS, fourteenth annual convention, Memphis, Tenn., Dec. 12 to 16.

NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES (NINTH), New York, Sept. 17 to 22.

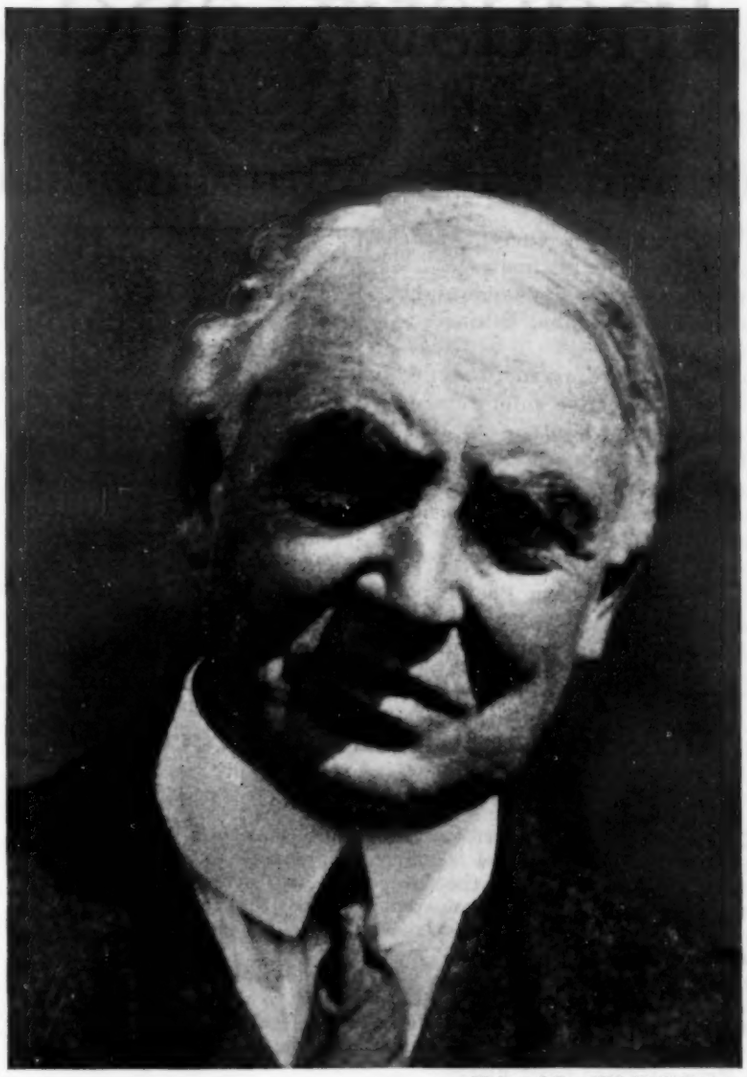
NATIONAL SAFETY COUNCIL, twelfth annual safety convention, Statler Hotel, Buffalo, Oct. 1 to 5.

Obituary

THOMAS BECKETT, Hamilton, O., president of the Beckett Paper Co., died July 22, in the Mercy Hospital at Hamilton, after an illness of 3 months, aged 63 years. Mr. Beckett was at one time president of the National Wood Pulp and Paper Manufacturers' Association, and at the time of his death was a director of the National Cover Paper Manufacturers' Association, as well as president of the local Chamber of Commerce. He is survived by a wife and seven children.

Warren Gamaliel Harding

Twenty-ninth president of United States, whose death has robbed the nation of a beloved leader.



Photograph From Wide World Photos

"President Harding is dead!"

Those four words must have filled every American with a deep sense of personal loss. The genial, calm friendliness of the President won from the whole nation a response that is in itself a supreme tribute to his personality. He became a national figure at a time when calmness, friendliness and courage were most needed. Disorganization was widespread, low morale was almost universal, business was demoralized. To have a leader like President Harding during those terrific months was a national asset that can not be over-estimated.

His administration will be memorable for the Pacific Disarmament Conference, which has proved to be a notable step toward international understanding. It will be memorable for the distinguished refinancing of the Victory notes. It will be memorable for the installation of the national budget system and for its admirable functioning during its trial period. In all of these things the President played a vital part, though frequently it did not develop until afterward just how vital a part it was. But it will be remembered by the people of this country for the friendly spirit of our dead President. For this the ever-open gates of the White House have stood as a symbol.

Industry and Trade

Current News and Market Developments

Summary of the Week

Arsenic production for current year will be less than earlier estimates.

Germans are working day and night forces in dye plants situated in unoccupied Germany.

American consuls are asked to secure information on prospective shipments of arsenic from foreign countries to the United States.

Report from China says adulterated China wood oil has increased in volume at shipping points.

Information, furnished in applications for changes in tariff, will be made public.

Reduction authorized of 14 per cent in freight rates from New York to southern Pacific points

Report from London states that plan for reorganization of Magadi Soda Co. are well under way.

Following recent decline in phenol prices for salicylates have been lowered.

Milk producers oppose investigation into advisability of reducing duty on casein.

Bulk lot of English linseed oil arrives in Los Angeles.

By-product coke oven plant will be built in Mexico by American company.

Representatives of Tariff Commission will go to Haiti and Jamaica to investigate production cost of logwood extract.

Reported that 15,000 tons of coconut oil sold at 7½c. per lb., c.i.f. Pacific Coast, Sept.-March shipment.

Increased demand for spot arsenic has caused prices to stiffen.

Sharp Decline in Chemicals Recorded Throughout July

THE DOWNWARD swing of prices for chemicals gained momentum in July and at the close of the month the average had dropped below the level established early in January. Hence price recessions which had their beginning in April and since then have been practically continuous, have dissipated the gains made in the first 4 months of the year.

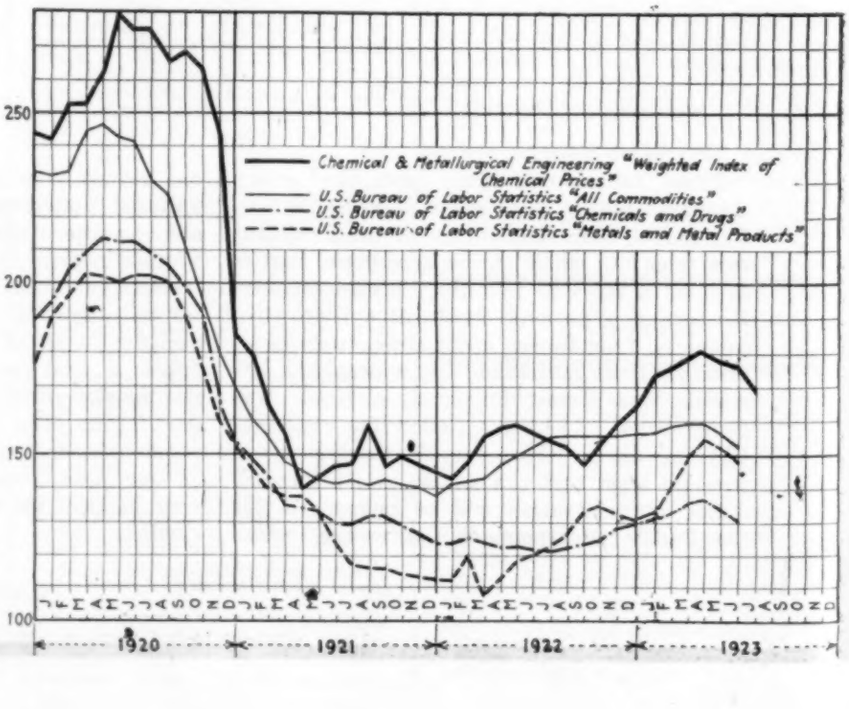
Chem. & Met's weighted index places the average price for chemicals and allied products, for July at 169.91, which compares with an average of 176.45 for June, or a drop of more than 3.7 per cent for the month.

Active buying sustained over a long period was responsible for the almost unbroken rise in prices from last October to April. A greatly decreased buying movement since April has weakened values with price declines apparently following in direct ratio to the dwindling of buying orders. Compared with pre-war standards, prices still show enhancement as the average for chemicals is 69.91 per cent higher than the average for 1913-14. In view of the fact that prices in general are above pre-war standards and considering that the downward tendency is practically inclusive, there seems to be some foundation for the belief that values are seeking a more natural and more stable level and that chemicals are sharing in the general movement.

It is generally held, however, that chemicals are influenced by the fact that large consumers have stocks of finished products to work off before production will increase materially and that demand for raw materials will reach large proportions in the fall months.

Statistics compiled by the Bureau of Labor report a decline in the general level of wholesale prices for June. Expressed by the Bureau's weighted index numbers, the decline was nearly 2 per cent or from 156 to 153. This decline includes price compilations on 404 commodities or price series. For chemicals and drugs the number was 131 for June and 134 for May and metals are represented by 148 for May and 152 for June.

The Bureau also offers a comparison with prices for June of last year and as measured by changes in the index numbers the general level had risen 2 per cent in the year. Metals and metal products show an increase of 23½ per cent for the same period and chemicals and drugs were 7½ per cent above the average of a year ago.



Arsenic Production Indicates Increase of 25 Per Cent Over Last Year

Figures for First Half of Year Show Lower Average Rate of Output Than Had Been Predicted

WHITE ARSENIC was produced at 9 plants operated by 6 companies in the United States during the first 6 months of 1923. According to the figures compiled by V. C. Heikes, of the Geological Survey, the sales during the first five months of the year and the estimated sales in June amounted to 6,035 short tons of refined arsenic, valued at 8.36c. to 15c. a lb., and 1,183 tons of crude arsenic, valued at 7.46c. to 10c. a lb. All contracts previously made to deliver arsenic at lower prices were completed with one exception. Besides these products, calcium arsenate was made directly from ore at Salt Lake City, Utah.

These figures show a lower average rate of production than that of last March, when the activities of the principal producers indicated a considerable increase rather than a decrease in the rate. No large stocks of arsenic remained at the works, and the prospect is good that production during the last half of the year will equal or exceed that during the first half. The rate of production maintained implies an increase of 25 per cent or more over the output in 1922 but is much less than the possible output stated last April, when proposed increases indicated a domestic production of 22,000 tons of white arsenic. In the United States all white arsenic plants provide for relatively high rates of production prior to the hot season and after its close, but during that season operations are curtailed or suspended. One plant was closed as soon as hot weather started in order to protect the men from the poisonous dust.

White Arsenic Imports

The imports of white arsenic during the first three months of 1923 amounted to 2,694 short tons, valued at $447,645. During this period Germany shipped the largest quantity of white arsenic—588 short tons, valued at $117,549—and was followed by Japan, with 513 tons, valued at $78,869. Other countries, named in order of size of shipments of white arsenic to the United States, were France, Belgium, Mexico, England, Canada, Dominican Republic, Brazil, and Australia. If the imports of white arsenic continued during 1923 at the rate of 800 tons a month the total available supply in the United States for the year will be about 21,000 tons.

No red or yellow arsenic sulphide was reported to have been produced in the United States during the period considered, but imports of these products amounting to 452 tons were received from China in January, 1923, having been shipped through a port of British India. Smaller quantities were shipped from France, Germany, England, Belgium, Canada, and Japan. Some metallic arsenic was received from Germany in February.

Supplies in the United States

The Western States have the largest undeveloped deposits of arsenic, and these are now receiving attention. Several new plants for the direct treatment of arsenic ores are planned. New sources of arsenic are necessary if the United States is to continue to supply the bulk of its requirements. At present the arsenic produced is largely a by-product obtained in smelting lead and copper ores, and the ores as charged into the furnaces contain an average of less than 1 per cent of arsenic. The deposits of Montana at present furnish the largest supply of arsenic. Enargite, the arsenical copper mineral in the ores mined at Butte, Mont., yields most of the 3,000 tons of white arsenic recovered annually at the Anaconda refinery. Since March, 1923, white arsenic more than 99 per cent pure has been produced at Jardine, Mont., at the rate of about 100 tons a month. With the addition of the arsenical speiss and flue dust produced at the East Helena lead smelter and shipped to Tacoma, Wash., and Globe, Colo., Montana leads the United States in its output of white arsenic, producing more than 4,500 tons annually.

Nevada has the largest available supply of arsenic above ground in the United States. At Eureka there is a great accumulation of speiss from smelting operations that were carried on in the seventies. During the first six months of 1923 this speiss dump was drawn on by the smelters in Utah and Washington at the rate of 2,000 tons a month. The speiss carries an average of 30 per cent of arsenic, and when all metallurgical losses are deducted it probably provides 3,500 tons of white arsenic annually. At Toulon, near Lovelock, Nev., the Toulon Arsenic Co. operates the only arsenic plant in Nevada. This plant roasts custom ore containing arsenic as well as arsenopyrite ore from the company's Irish Rose mine, near Battle Mountain. This ore contains an average of about 15 per cent of arsenic and some gold, silver, and copper. The Toulon arsenic plant makes about 100 tons of crude white arsenic a month, and the product finds a ready sale on the Pacific Coast. The residue from the roasting operations is sent to smelters in Utah.

Utah ranks third among the States in the production of arsenic obtained from ores originating in the producing State. The ores received at the smelters in Utah average about one-fourth of 1 per cent of arsenic, and the possible output of white arsenic under normal conditions does not exceed 2,500 tons annually. Considerable arsenical ore that averaged over 20 per cent of arsenic was shipped from Gold Hill, Utah, to a lead smelter during the first six months of 1923, and some ore of lower grade was shipped to the insecticide works at Salt Lake City. Gold Hill promises to be the greatest source of arsenic in the United States for some time to come. Recent shallow prospecting at Gold Hill has opened a solid mass of arsenopyrite ore 20 feet thick but has not reached the country rock. At the Tintic Standard mill, at Harold, Utah, a small quantity of refined arsenic is being saved as a by-product in the treatment of silver ore. The additional richer arsenical ore from Gold Hill that is being fed to the smelter furnaces and the equivalent of white arsenic recovered from ore at the insecticide works bring up the present output of Utah to 3,500 tons of white arsenic annually.

The smelting plant at Tacoma, Wash., treats speiss from Eureka, Nev., speiss from smelters in Montana and California, and considerable ore from Alaska, California, and British Columbia. The arsenic plant at Tacoma refines the dust from the company's smelting system, as well as considerable arsenical dust that is shipped from Utah. California and Alaska probably rank fifth and sixth respectively as sources of arsenic. All the by-products containing arsenic received at the Globe refinery in Colorado are shipped from smelting works of the American Smelting & Refining Co. Most of the arsenical dust and fume treated at Globe is shipped from Utah and Montana, and some of it probably from smelters in Colorado.

Several large undeveloped deposits of arsenical ore have been reported in Colorado, Montana, New Mexico, South Dakota, Nevada, California, Oregon, Idaho, and Washington, but none of these deposits has been investigated by the Geological Survey. A thorough study of all arsenical ore deposits in the United States is much to be desired.

Another South African Steel Merger Coming

Proposed amalgamation of the South African Iron and Steel Corp., (Ltd.), and the Newcastle Iron and Steel Co. (Ltd.), is reported to the Department of Commerce by Consul C. J. Pisar, Capetown. Announcement of the proposed merger followed shortly upon the amalgamation of the Union Steel Corp. (Ltd.), with the South African Iron and Steel Corp. (Ltd.). The consolidation of the three plants will bring the combined output appreciably nearer the Government's bounty of 15 shillings per ton offered in respect of plants with a minimum capacity for iron and steel production from native ores of 50,000 tons per annum. It is reported that the new concern has the support of large and important financial houses and steel producers in England.

Washington News

Questionnaire on Prospective Shipments of Arsenic

A questionnaire prepared by the U. S. Geological Survey is being sent to American consuls with the idea of securing further information as to prospective shipments to the United States of white arsenic. While the shortage of arsenic poisons is likely to be less acute next spring, it is the opinion of the Government specialists interested in this subject that the country will be able to consume, at much the same levels of price as those which have prevailed during the past year, all of the arsenic likely to be produced in this country or brought in from abroad.

It can be estimated very closely that 15,000 tons of refined white arsenic will be made available by the domestic plants. The uncertainty of the situation is the amount which may be expected from foreign sources. It is known that the information that the United States is in the market for arsenic at attractive prices, has percolated to the far corners of the earth. Arsenic is a widely distributed material. Under such circumstances it is believed advisable to secure all advance knowledge possible of imports expected.

Domestic production will not be decreased by the fact that some of the producers are closing their plants during the periods of greatest heat. They simply will allow the material to accumulate and push refining operations when it is cooler.

Oppose Reduction of Duty For Casein

John D. Miller, president of the National Milk Producers' Federation has stated that milk producers will fight a reduction in the rate on casein. The new tariff act, he asserted, is the first law to give the dairymen protection commensurate with the protection given the middlemen.

The commission has scheduled a hearing for August 13 on the application of coated paper manufacturers for a reduction in the present rate of 2½c. per pound on casein.

Glass Factory for Kabul

It is reported that the Amir of Afghanistan has granted important concessions to a firm of industrialists, at Delhi, India, for starting a glass factory at Kabul. A short time ago a party from a Delhi glass factory proceeded to Kabul on the invitation of the Amir's government in order to examine facilities for the manufacture of glass in the latter place. The party has just returned to Delhi and it is stated that preparations are being made to start the work of erecting a factory at Kabul.

Coal-Tar Products Gain in Export and Import Trade

Despite the unfavorable business situation in many countries, exports of coal-tar products from the United States are regarded as having taken place in encouraging volume during the first seven months of the calendar year. Taking that period as a whole, the imports of these products also have shown a surprising tendency to increase. This is explained largely on the ground that there has been great industrial prosperity in the United States. A considerable proportion of these imports have been non-competitive articles.

An analysis of the figures for the first six months and of the available information as to the movement during July indicates that the increased exports are moving to the smaller markets, in many cases to markets not accustomed to purchase coal-tar products in the United States. Apparently there has been some decrease in the amount of exports moving to some of the larger and better established markets. Such declines as have been suffered evidently are traceable to the general slump in consumption due to business conditions. The fact that the new business from a large number of small centers of consumption has made it possible for exports to move in increasing volume is regarded as a very encouraging sign, since it gives a degree of stability to the industry which cannot be had when chief reliance is placed upon a few large markets.

Gain in Sodium Output

The production of natural sodium compounds in the United States in 1922 amounted to 45,406 short tons, valued at $1,415,774, according to reports made by the producers to the Department of the Interior through the United States Geological Survey. These figures show an increase of about 82 per cent in quantity and 58 per cent in value over those for 1921. The materials marketed were sodium carbonate (soda ash) and sodium bicarbonate from Keeler, Inyo County, Calif.; sodium sulphate (glaubers salt) from Lake Point, Tooele County, Utah, and Casper, Natrona County, Wyo.; sodium borate (borax) from Trona, San Bernardino County, Calif.; and trona (a double salt of sodium carbonate and sodium bicarbonate) from Keeler and Trona.

The output of boron minerals in 1922 amounted to 85,220 short tons, valued at $2,705,140, an increase of 70 per cent over the output in 1921. The minerals produced were borax (sodium borate) from Trona, San Bernardino County, Calif., and colemanite (calcium borate) from Death Valley Junction, Inyo County, Calif.

South China Increases Use of Chemical Fertilizers

Leroy Webber, consul at Hongkong, has forwarded a report in which he states that the use of chemical fertilizers in South China has shown a marked increase in the past few years. During 1922 the imports of these products into Hongkong amounted to 15,410 tons, valued at $1,516,967, as compared with 3,612 tons, at $410,746, for 1921, and 2,308 tons, at $453,860, for 1920.

Until 1922 Great Britain and Japan were the principal sources of supply, about 40 and 25 per cent, respectively, coming from these markets, while the United States ranked third in importance, furnishing an average of 14 per cent of the total annual importation. During the past 12 months, however, this situation has gradually changed. American manufacturers succeeded in obtaining almost 35 per cent of the business done in 1922, as compared with 28 per cent secured by British manufacturers and 24 per cent by Japanese.

The fertilizer most in demand is sulphate of ammonia, which contains 25 per cent of ammonia and 21 per cent of nitrogen.

Special Colors Produced by Italian Manufacturers

Considerable success is surrounding the policy of Italian dye manufacturers to specialize in certain colors. A report to the Department of Commerce covering the general business situation in Italy makes reference to a few chemical activities. Definite progress is being made by the industries engaged in the installation of perfumes and essential oils. The citric acid industry is passing through a period of depression.

Germans Push Dye Production Outside of Ruhr

Even if the occupation of the Ruhr is extended indefinitely, it is apparent to observers returning from Germany that that country will continue to be a factor in the dye markets of the world. The transfer of stocks and orders from the plants in the Ruhr to those in unoccupied Germany have made it possible for the latter plants to operate day and night at full capacity. Credit has been extended by the German government to the dye plants outside of the Ruhr with the result that they are operating under highly favorable conditions.

Russians Will Purchase Dyes Through Syndicate

A report from Moscow states that according to the *Ost Express* the Textile Trust of Russia has decided to effect its purchases of dye through the Textile Syndicate. The All Russian Textile Syndicate is entitled to act independently on foreign markets and has organized representation in Berlin and London.

News Notes

The Tariff Commission's field work continues. C. H. Penning of the Chemical Section of the Commission and M. Braun of the staff of accountants, sail August 8 for Haiti. There they will investigate the production cost of logwood extract. This is due to the application made under the flexible tariff law for a change in duty. Before returning, these investigators will visit Jamaica. These investigations conclude the field work on logwood extract, as the domestic work has been completed.

Federal taxation of mines will be the topic of discussion of the fourth annual conference of the general tax committee, to be held at Milwaukee, Wis., September 24-29. The meeting will cover important questions arising under the federal revenue laws relating to mining profits, inventories, retrospective appraisals, depletion rates, discovery value, reorganizations and corporate distributions.

A course in distribution will be a feature of the coming summer session of the National School for Commercial and Trade Executives. The course will be held at Northwestern University and will be directed by Alvin E. Dodd, manager of the Domestic Distribution Department of the Chamber of Commerce of the United States.

Manufactured gas again displaces natural gas. The Central Indiana Gas Company has recently been authorized to establish a new schedule of artificial gas rates for Muncie, Hartford City, Fairmont and surrounding territory, where the manufactured product is to supersede the natural.

The production of arsenic in Canada in 1922 amounted to 2,576 tons, valued at $321,037 which was an increase of 73 per cent in quantity, but only 37 per cent in value over the production of 1921. Approximately four-fifths of this was produced in the smelting of the silver-cobalt-nickel ores of Northern Ontario.

The glass industry will see its products from both ends of the manufacturing scale, shown at the 1923 Chemical Exposition in September at the Grand Central Palace, New York. Numerous displays of finished bottles, jars, carboys, laboratory equipment, and so forth, for the chemical consuming manufacturer, will be shown, in addition to the usual full line of chemical raw materials for the glass manufacturer.

Paper pulp from straw is to be studied in Canada. Sir Frederick Becker, the noted paper manufacturer, is to make the investigation. Sir Frederick is now on his way to Canada from his home in England and expects to remain there about two months.

Toronto, Ontario, has been singled out for quite a distinction by the decision of the British Association for the Advancement of Science to hold the annual convention of the association there next year.

The salt mines at Malagash, Nova Scotia, have reached a depth of about 300 feet and the output is about 40 tons per day. The quality is now much better than at the commencement of operations and the manager states there is no limit to the demand so long as the output comes up to requirements.

German Dye Production for June

The following information, received by cable from Trade Commissioner F. E. Breithut, dated July 25, is rendered relative to the German production of dyes for the month of June, according to groups. In addition, the production is rendered according to factories:

Group	Classification	Lb.
I	Alizarin red	209,035
II	Indigo paste	576,400
III	Vat colors except indanthrene blue G. C. D.	236,385
IV	Indanthrene blue G. C. D.	Zero
V	Alizarin colors other than red	177,619
VI	Direct colors for cotton	2,750,097
VII	Direct colors for diazotization	281,221
VIII	Acid colors for wool	1,305,005
IX	Chrome colors for wool	709,799
X	Basic colors	270,257
XI	Sulphur colors	2,098,554
XII	Lake colors	247,782
XIII	Intermediate products	.....
	Total	8,862,154

Factories	Lb.
Barmen	29,251
Berlin	1,397,317
Beibrich	199,162
Dusseldorf	21,639
Frankfort	1,960,552
Greisheim	715,150
Hoechst	576,400
Leverkusen	3,089,680
Ludwigshafen	131,111
Mulheim	57,578
Uerdingen	384,314
Grand total	8,862,154

Badische produces only indanthrene black blau gelb for printing and kryogene black. Hoechst produced only indigo paste. The June production represents an increase of 19 per cent over that of May. It is interesting to note the large production increase featured in indigo paste, sulphur and direct colors for diazotization. This is an indication of the efforts of Germany to regain the Far East market.

Chemical Exposition to Distribute Tickets

Tickets for the 1923 Chemical Exposition which will open on September 17th at the Grand Central Palace, New York, will be sent to exhibitors by Aug. 20 in order to permit the mailing of them in plenty of time to reach those interested early in September. Exhibitors have been requested to distribute tickets with care so as to cut down the really non-chemical element at this year's Exposition to a minimum. Owing to the crowding at the Exposition in past years during the last three days, the first three days of the week are suggested as the best time to view the exhibits in comfort and to avoid the crowds.

Rubber Firms Start Manufacture in Canada

The Paramount Rubber o., Ltd., will be established in the Eastern Townships to develop the Canadian business, and to look after the export trade to various parts of the British Empire. It is a subsidiary of the recently amalgamated interests of the Paramount Rubber Co. of Little Falls, N. J., and the Hodgman Rubber Co. of Tuckahoe, N. Y. The new company will take over the plants of the Regal Rubber Co. at Sherbrooke and will commence production at an early date, as some large contracts which the American company had in the Canadian field have been turned over to the Canadian corporation.

A. S. R. Co. to Build Coke Ovens in Mexico

The American Smelting and Refining Company through their consulting engineer, William Hutton Blauvelt, 120 Broadway, New York City, have recently let a contract for a byproduct coke oven plant at their coal mines at Rosita, Mexico. The Wilputte Coke Oven Corporation, 469 Fifth Ave., New York, has contracted to erect 40 Wilputte regenerative coke ovens, with complete byproduct plant.

The plans include a new power house, shaft house and hoist and a coal washer. The coke produced in the oven plant will be used in the smelters of the company and in the general trade. The motor benzol will be sold locally, and the tar and ammonia will go into the general market. The gas will be used in a zinc smelter, which the company will erect at Rosita.

John C. Treadwell Heads Rubber Investigation

The Department of Commerce has announced the personnel of the Caribbean rubber investigating party which sailed from the United States for Panama on July 25 to investigate the rubber plantation possibilities of Panama, Colombia Venezuela, the Central American countries, and Mexico.

John C. Treadwell of New York, a plantation expert of practical experience, will be in charge of the party. Mr. Treadwell has been connected with the Continental Rubber Company of New York for the past several years. During the period 1914-17 he investigated the rubber planting industry of the Far East for the company. During 1917-22 Mr. Treadwell was vice-president of the Continental Rubber Company and associated companies. For the past year he has been importing crude rubber on his own account.

Hugh H. Bennett of the Bureau of Soils, Department of Agriculture will accompany Mr. Treadwell as assistant.

Curtis R. Hill of Middleboro, Ohio, and Washington, D. C., formerly connected with the Costa Rica branch of the United Fruit Company, will accompany the party as secretarial assistant.

Activity in Leather Trade Increased Demand for Sicilian Sumac

Imports Running Far Ahead of Last Year—Domestic Sumac Is Acceptable Substitute

AMERICAN sumac, with careful harvesting and proper curing methods, would make an excellent substitute for Sicilian sumac, according to H. M. Hoar of the Research Division of the Department of Commerce. For the production of a bright and properly-cured domestic sumac, the earnest co-operation of buyers and gatherers is essential. This can best be achieved through paying the collectors a price commensurate with the quality as an incentive to more careful gathering and better curing. Such procedure would materially aid the development of the sumac industry, and thereby lessen the dependence of American tanners upon the imported product. The tannin content of the best American sumac ranges from a minimum of 19 to a maximum of 35 per cent; that of good Sicilian sumac averages 28 per cent. Renewed activity in the leather industry has considerably increased the demand for sumac, as a result of which prices are advancing. Early July quotations were $80 to $85 per ton.

Sumac is found abundantly in the United States, and is especially accessible east of the Mississippi River, from Maine to Georgia, where plentiful stands are found. It is harvested on a large scale in Virginia, North Carolina, Maryland, and Pennsylvania. American sumac, owing to careless gathering and curing, gives a darker-colored leather than the sumac imported from Sicily, and, since sumac is mainly used for tanning light-colored leather, this characteristic renders the American product less desirable than the Sicilian, and, therefore, decreases its value. Buyers of sumac leaves for grinding depends largely upon color for determination of value. A bright green color is evidence that the leaves have suffered neither from rain after being gathered, nor from heating during the process of drying. Sumac should be kept in the drying house for at least one month before sending to market. The leaves of the upper extremities of the stalks are always richer in tannic acid than those of the base; and the increase in the age of the plant is accompanied by a general diminution in this acid. To ensure a maximum value for tanning purposes the leaves should be gathered when full of sap, before they have begun to wither or have been affected by frost.

For the purpose of tanning white, and light-colored leathers, collection should be made in June; but when darker colors are desired, collection should be made in July. The percentage of tannin in American sumac gathered in June is 23; while that gathered in July is 27. It is evident, therefore, that if a maximum of tannic acid is desired the sumac should be collected in July; but if delicacy of tint is the main object, then collection should be made in June. The coloring matter in the leaves has an important influence in determining the value of the product. The portions of the plant usually considered of value for tanning purposes are the leaves and the stems; but as the stalks contain from 5 to 10 per cent tannin—an amount too large to discard considering the expense incurred in collecting and hauling to market—an extract could be made from them and the off-colored leaves that would be a satisfactory tannage where color is not of premier importance.

Comparison of the receipts of sumac from abroad for the first five months of 1923 with those of the corresponding period of 1922 would indicate that the total imports for 1923 will register a considerable increase over the preceding year, and that the preponderance of favor continues on the side of the ground product. The total imports of both ground and unground sumac during the Jan.-May period of 1922 were 3,138,012 lb.; while the imports for the corresponding period of 1923 aggregated 9,031,680 lb., or 73 per cent of the total imports for the whole year of 1922. As the harvesting season is from June to September, and as receipts are consequently heavier during the last six months of the year, the imports for the first five months of 1923 bespeak a marked growth in the use of sumac over recent years. Italy has a virtual monopoly of this trade, the participation of other countries therein never having exceeded 4 per cent in any year since 1919 when our imports of sumac were 100 per cent Italian.

The imported extract for the five-month period was negligible, amounting to only 460 lb. received in Feb., and valued at $23. These figures clearly disclose greater activity in the domestic manufacture of sumac extract and the decided preference of United States tanners for the home product.

Sicily is the largest producer of sumac in the world, followed by the United States. The production, however, has considerably decreased within the past few years, owing to the cessation of cultivation during the war, and, since then, to the increased cost of labor and transportation which have been out of proportion to the rise in price of sumac. However, this situation may be only temporary. While formerly the annual output varied from 40,000 to 60,000 tons, it has ranged from 20,000 to 30,000 tons per annum within recent years.

Chemical Show Wants Motion Pictures

A call for motion picture films to be shown at the 1923 Chemical Exposition when it is held this fall at the Grand Central Palace, New York, during the week of September 17-22, has been sent by the management to exhibitors. Films of a technical nature covering some phase of the chemical, chemical consuming, equipment, or allied industries are being procured.

Trade Notes

L. A. Ault, president of Ault & Wiborg of Cincinnati, is in Europe and will spend about two months touring through France, Belgium and British Isles.

A well-defined demand for copper sulphate exists in southern France, says a report to the Department of Commerce.

The importance of Brazil as a market for pharmaceuticals is indicated in a report to the Department of Commerce, showing that $23,886,983 worth of those products were sold in Brazil during 1919. The figure is a conservative one as it is taken from the tax returns.

The steamer Mayebashi Maru arrived at San Francisco July 30 with 340 cs. of white arsenic from Hong Kong.

Final statistics of shipments of manganese and manganiferous ore containing more than 10 per cent of manganese from mines in the United States in 1922 amounted to 358,078 tons valued at $1,526,940, together with 251,614 tons valued at $632,039 of ores containing 10 per cent or less of manganese.

The asbestos industry of the United States came to a standstill in 1922, only 67 tons valued at $10,120 being produced.

The general offices of the Western Petroleum Refiners Association will be established at Tulsa, Okla., beginning Sept. 1. Howard Bennette will act as secretary for the association.

English Linseed Oil Arrives at Los Angeles

A cargo of bulk linseed oil was received at Los Angeles recently from Hull, England, comprising 740 net tons, or approximately 4,000 bbl. It was imported by the W. P. Fuller Co., to be made into paints and varnishes.

The value of the cargo was placed at $125,000 and the import duty of nearly $50,000 thereon is said to be the largest paid to the Collector of Customs of the district on any previous consignment of a single commodity.

The shipment was conveyed in one steel tank located about midship and below the main deck, and was confined in the tank by a steel hatch held in place by bolts.

The unloading, which required twelve hours, was done by the Vegetable Oil Products Co. and the oil was pumped into the steel tanks of this company, where it will be stored, pending its delivery to the owners as required.

Small Stocks and High Prices Feature China Wood Oil at Primary Markets

Transportation Difficulties Interfere With Movement From Interior —Adulterated Oil Increases in Volume

A REPORT on conditions surrounding the wood oil market at Hankow during May has been issued by the Department of Commerce from reports made by Consul General Heintzleman and Commercial Attaché Arnold at Peking. The situation of the market was described as bad with no prospect of substantial improvement during the summer.

Prices at Wan Hsien were about 25 taels per picul, while those of Hankow ranged from 31 to 36 taels, and even in one instance reached 40 taels. Disturbed political conditions, preventing cargoes from coming down from Wan Hsien, accounted for the higher prices in Hankow. There was at that time little reason to believe that any great reduction would occur very soon, as futures for as far ahead as August and December were selling at the then prevailing market prices.

It was rather anomalous that larger amounts of wood oil, say from 5,000 to 10,000 tons, would have cost more than smaller lots of 100 tons or less. This was directly attributable, however, to the sensitiveness of the market, which promptly reacted to any transaction of size. For that matter, the season was about over, and it is probable that not more than 5,000 tons could have been obtained altogether.

Speculators held very little, if any, of the stocks on hand. In fact, investigation showed that there were approximately 1,500 tons in stock, the greater part of which was in the hands of an American concern specializing in the exportation of wood oil to the United States. Large amounts of adulterated oil had been coming into Hankow, the adulterants being tallow, sesamum oil, and tea oil, and high percentages of adulterations were common.

Because of political disturbances in Szechuan, prospects for a good crop in this section are not very bright. The outlook for the Hunan crop, however, is considerably better. An observer, competent to express an opinion in regard to the situation, believes that if political conditions were more favorable and the local markets were under the export price, there would be a considerable quantity of China wood oil offered for export, although it is a question as to whether or not the demand for wood oil has risen to such a point as to exceed the actual supply. In this connection absence of positive information as to amounts actually produced, and the fact that a large quantity is used by native consumers, handicap decidedly the preparation of a reliable forecast of future available supplies.

World's Dairy Congress Association Announces Program

The program of the World's Dairy Congress is now made public by Dr. L. A. Rogers, director of the reasearch laboratory, dairy division, U. S. Department of Agriculture. Dr. Rogers is chairman of the program committee of the World's Dairy Congress Association. The full program can be obtained from him at the association's office, 426 Star Building, Washington, D. C.

The World's Dairy Congress is to be a conference of international representatives of the dairy industry, its related sciences and public health and social welfare agencies. Its purpose is to bring together the forward-looking leaders who are shaping the trend of the industry; to exchange the newer knowledge of the sciences and practices of dairying and allied activities; to study the economic forces which influence domestic and international commerce in dairy animals, products and equipment; to discuss methods of disease prevention and of regulating and controlling the sanitation and standards of dairy products; to consider the influence of a wise use of milk and its products on national health and the vital importance of the part which they play in human development.

In order that delegates may obtain a comprehensive survey of the American dairy industry, the sessions of the Congress will be held at Washington, D. C., on October 2 and 3, at Philadelphia, Pa., on October 4 and at Syracuse, N. Y., from October 5 to 10.

At Washington, D. C., the discussions will deal with the broader international questions — scientific, economic and humanitarian. At Philadelphia, Pa., the Congress will discuss the relation of milk and its products to public health. The National Dairy Council will demonstrate its methods of presenting milk facts to the public. This will include work with civic groups and public school children. At Syracuse, N. Y., the Congress will consider the special subjects of peculiar interest to the various branches of the industry.

New Asbestos Plant Opens

A new asbestos plant 150 feet wide by 1,000 feet long, is to be erected at once at Asbestos, Que. For some considerable time the feasibility of manufacturing asbestos products in Canada close to the source of raw material has been considered. Heretofore the raw product has been shipped to the United States, and Canada imported the manufactured goods. This will now be changed and the manufacturing will be done in Canada.

Metal Industry Wants Oxygen Research

Believe Active Work Necessary if German Competition Is to Be Met— Report Prepared by Special Committee

Spurred by the knowledge that their German competitors are working actively on the application of oxygenated air to metallurgical processes, the industry in this country is making insistent demands upon the government for research work in that connection. It long has been known that in the production of 1 ton of pig iron, 3 tons of inert nitrogen pass through the furnace. This is true to a more or less extent in all furnace operations where the heat is derived from the combustion of fuel by atmospheric air.

An exhaustive report on the subject made by a committee representing interested industries, headed by M. H. Roberts, of the Franklin Railway Supply Co., will be made public within a few days. It is understood that this report will show in a conclusive way that the use of oxygenated air in blast furnaces will permit the use of lower grade materials and make possible a material reduction in the cost of resulting metals.

The plan for this work was the conception of F. G. Cottrell, but no opportunity was offered during his tenure of the office of director of the Bureau of Mines to put the plan into effect. This was done, however, by Dorsey A. Lyon in his capacity as chief metallurgist of the bureau. F. W. Davis made the metallurgical calculations. These calculations have been checked carefully by Mr. Roberts' advisory committee, which challenges anyone to find a mistake in them.

Brick Makers Adopt Simplified Practice

Through the good offices of Herbert L. Hoover and the simplified practice division of the Department of Commerce, the brick industry has at one stroke been enabled to sweep away an infinite variety of odd sizes of brick and establish one standard size for the seven billion building brick produced every year in the United States. This size is approximately 8″ x 3¾″ x 2¼″. The only exception now to be allowed is in the case of smooth faced brick for special exterior use, in which a very slight variation in one dimension only is permissible.

The common brick industry established the standard size some years go, but experienced trouble because its standard was not insisted upon for public work and by many architects.

With the Government now definitely supporting the industry in its efforts to standardize its products it is expected that before long all specifications will call for standard sized brick, to the great benefit not only of the brick industry but to all users of its product.

Facts and Figures That Influence Trade in Chemical Products

Market Conditions

Current Prices
Imports and Exports
The Trend of Business

Better Inquiry and Reduced Selling Pressure Steady Chemical Prices

Trading Still Quiet but Interest Improves—Firm Markets Abroad Strengthen Many Imported Chemicals

THE weighted index shows a decline for the week in the average price of chemicals. This, however, is caused by price fluctuations in allied products as the majority of chemicals were firmer than a week ago. This firmness was expressed in a few instances by higher prices and in others by an absence of selling pressure and a reserve on the part of holders to force sales.

For the first time in several weeks arsenic showed signs of strength. This was regarded as a temporary condition as the inquiry was for spot goods. However it caused some comment that prices should harden under demand for moderate amounts and caused some uncertainty about the amount of arsenic actually held unsold. Calcium arsenate also found more calls from buyers but the latter appear to have price views below that of sellers and total business was said to be small for the week.

Cables from European markets have indicated that replacement costs of many foreign chemicals have advanced and this has steadied the spot market for caustic potash, permanganate of potash, nitrite of soda, chlorate of potash, and prussiates. The spot supply of most of these materials also has been reduced and this has partially removed pressure on the part of holders. Among domestic materials on which prices were steadier during the week were bichromates of soda and potash. Competition among sellers has been keen but it is felt that prices are too close to production costs to admit of any sustained declines from recent levels, unless there is a corresponding lowering in the position of raw materials. Bleaching powder has received some attention due to reports of price cutting and to predictions that further price reductions might follow. Prominent factors in this trade say outside of some concessions granted to move spot bleach, the market is in a good position and they look for a firmer market in the fall months.

The metal salts are rather easy due to seasonal falling off in consumption and to lower producing costs. The July price schedule has been retained for August shipments of tin crystals and bichloride of tin. Some of the lead and copper salts have been shaded in price on recent transactions and the price trend is said to depend on future movements of the basic materials.

Acetic Acid — Corroders are taking regular deliveries and other consuming trades are interested enough to take up the greater part of production. New business is not active but prices do not vary and apparently are well established at $3.38@$3.63 for 28 per cent, $6.78@$7.13 for 56 per cent, $9.58@$9.83 for 80 per cent, and $12@$12.78 for glacial, with the range on the latter, depending on seller and make.

Arsenic Higher on Spot—Bichromates Firmer — Prussiates Steady — Imported Nitrite of Soda Advances—Bleaching Powder Easy—Salicylate of Soda Lower—Copper Sulphate Easy — Imported Caustic Potash Stronger—Calcium Arsenate Irregular —Sulphide of Soda Dull and Lower

Citric Acid—Reports from Italy say that the citric acid market is depressed with very little buying. Shipment prices from Italy are quoted c.i.f. New York at prices which work out a little under 50c per lb. duty paid. Spot acid is meeting with very little call and while 51c. per lb. is given as the price the market is practically 50@50½c. per lb. Domestic makers are holding their price at 49@50c. per lb.

Formic Acid—Imported acid is moving moderately with no feature to present trading. Stocks on hand are not oppressive but are sufficient to satisfy buying requirements. Prices are steady at 12@14c. per lb. according to seller and grade.

Muriatic Acid—Production has been curtailed in recent weeks and despite reduced consumption, stocks are said to be only moderate. New business continues to be spasmodic and values are easy as a result. The quotation of prominent producers is repeated at 90c. @$1 per 100 lb. for 18 deg.; $1@$1.10 per 100 lb. for 20 deg.; and $1.75@$2 per 100 lb. for 22 deg.

Nitric Acid—The market is in a waiting position with recent and present business dull. Prices are none too stable but the market can hardly be called weak as improvement in demand would probably create a firm price level at once. Current quotations are 4½@5c. per lb. for 36 deg.; 4¾@5¼c. per lb. for 38 deg.; 5¼@5¾c. per lb. for 42 deg.

Oxalic Acid — Domestic material is holding a steady position and producers continue to quote 12¼c. per lb. and upwards, according to quantity, f.o.b. works. Imported acid was quiet during the week with spot prices held at 12½c. per lb. with futures receiving very little attention.

Tartaric Acid—A steady withdrawal of domestic makes is reported and contract deliveries appear to be taking care of a large part of consumers wants. The quotation is held at 37½c. per lb. Imported acid is in a nominal position. With buying at a standstill holders of stocks have been willing to cut prices in order to arouse buyers. Prices heard on spot are 34@36c. per lb. Foreign markets are reported to be weak and this also has a weakening effect on spot values.

Potashes

Bichromate of Potash—There was an improvement in demand and a firmer tone was noted. In some quarters 10¾c. per lb. was asked for spot goods and while 10½c. per lb. was repeated, the situation was undoubtedly stronger and it is evident that prices are in a position to respond to any improvement in demand.

Caustic Potash—The spot market was firmer and 7½c. per lb. was an inside figure for imported material. Offerings for shipment from abroad are reported to be more firmly held and with replacement costs higher the spot market was steadier. Domestic is said to be meeting with some call from consumers in spite of the fact that 9c. per lb. and upwards, according to quantity, is asked at works.

Chlorate of Potash—Domestic makers are holding chlorate on a steady level with asking prices at 8½c. per lb., at works. A large part of production is said to be sold ahead and there is a steady movement against standing orders. Imported chlorate is held on spot at different prices with quality having much to do with the range from 6½c. to 7½c. per lb.

Permanganate of Potash — Primary markets continue to hold above the parity of spot prices at New York and as stocks at the latter point have declined, prices are firmer with an absence of cutting to dispose of distressed lots. The lowest price heard was 17c. per lb. and some holders are asking 17½c. per lb. but offerings are fairly plentiful at the inside figure and buying is still slow.

Prussiate of Potash—There is hardly enough of trading in red prussiate to establish a definite price. Open quotations range from 64c. to 66c. per lb.

but the lower figure might be shaded on real business. Yellow prussiate is firmer on spot. As low priced lots have been taken off the market, the tendency of prices was upward and spot material in the latter part of the week was held at 34@35c. per lb. This material is holding too wide a differential over soda to invite free trading and the market is quiet. Prompt shipment from abroad was offered at 30c. per lb. and for Sept. forward shipments there were quotations of 29c. per lb.

Sodas

Acetate of Soda—Spot material is still pressed for sale and 5c. per lb. is said to be a trading basis although open quotations are 5¼c. per lb. and upwards and works prices are still given at 5¼c. per lb. Demand is very slow and only occasional sales are made with reports that last sales were at 5c. per lb.

Bichromate of Soda—While no real change in quotations was made, the undercurrent was firmer. In some cases where 7¾c. per lb. was quoted a week previous, 7¾c. per lb. was given as the inside asking price. Some improvement in demand was reported and prices are so close to producing costs that a change for the better in buying would no doubt have a bullish effect on prices.

Caustic Soda—Details regarding May exports show that Japan was the largest buyer with 4,822,399 lb. out of a total of 11,269,945 lb., going to that country. Inquiry for export has been slow recently and total export business is running considerably below that of last year. Prices for export are unsteady with $3.15@$3.30 per 100 representing f.a.s. quotations. The range depends on seller and make. Domestic business is fair and 3.16¼c. per lb. is maintained as the carlot quotation at works. Ground and flake are offered at 3.60c. per lb., works.

Cyanide of Soda—Most holders of imported are asking 20c. per lb. for spot goods but it was possible to buy at 19c. per lb. There was little interest among buyers. Domestic makers quote 22c. per lb. and upwards with a moderate movement reported.

Nitrite of Soda — There were sales of imported nitrite of soda on spot at 7¼c. per lb. which represents an increase of ¼c. per lb. over the low of the preceding week. Domestic nitrite was unchanged at 7¼c. per lb., at works, with trading reported as routine. Considerable interest has been aroused by the setting of a date for a tariff hearing on this material in response to a petition for an increase in duty.

Prussiate of Soda—Domestic prussiate has been reduced in price to 14½c. per lb. for August deliveries. This apparently indicates a weakness in the market but is rather an adjustment to meet more closely the price of imported material as the former quotation of 15½c. per lb. for domestic was purely nominal. Imported prussiate was firmer during the week and toward the close the best price heard was 13¾c. per lb. with many sellers asking 14c.

"Chem. & Met." Weighted Index of Chemical Prices

Base = for 1913-14

This week	166.70
Last week	167.02
Aug., 1918	278.00
Aug., 1919	251.00
Aug., 1920	264.00
Aug., 1921	158.00
Aug., 1922	152.00

Chemical prices steadied a little, but another moderate decline in the vegetable oil group brought out a reduction of 32 points in the week's index number.

Salicylate of Soda—Lower prices for raw materials has been a factor and resulted in a marking down of prices to the extent of 5c. per lb. During the period sellers were offering at 40c. per lb., in drums as against the previous asking price of 45c. per lb.

Miscellaneous Chemicals

Arsenic — Some inquiry for spot arsenic developed and caused a stiffening in asking prices. Sales were made in the early part of the week at 8¾c. per lb. for spot goods. Later on buying orders for fair sized lots appeared and holders turned down bids at the 8¾c. level and when the bids were raised to 9c. per lb. they likewise were refused and 9¼c. per lb. was asked. Some goods afloat were held at 9¼c. per lb., but demand seemed to be confined to strictly spot material. Domestic arsenic is quoted at 9¼@10c. per lb. delivered over the balance of the year.

Bleaching Powder—Considerable attention has been given the bleach market because of reports that certain holders of spot goods were cutting prices in order to reduce holdings. It was admitted that as low as $1.50 per 100 lb. could be done on spot material although there was no general reduction to that level and most sellers report their quotation at $1.75 per 100 lb. In explaining the easy position of the market prominent factors say that price shading is due entirely to desire to move spot goods because of difficulty in storing it through the hot weather. They maintain there is no real weakness which would presage low prices in the fall as production costs are too closely approximated by present selling prices.

Calcium Arsenate—Reports of weevil damage in Georgia and other southeastern states have brought about a better inquiry for calcium arsenate. Bid prices, however, have been too low to admit of much business. There is no stable price for arsenate and factors in the trade say prices are from 11¼c. per lb. to 14c. per lb. according to seller.

Copper Sulphate—Demand has been fair according to producers but prices have been easy and the quotations on domestic are 5.25@5.35c. per lb. delivered. Import sulphate is arousing no interest and is quoted at 5c. per lb. on spot with shipments available around 4½c. per lb.

Salt Cake—Demand is light but offerings of salt cake in the local market are very light and producers are said to be using their output to make contract deliveries. Production has been cut down and this partly accounts for the scarcity of spot supplies. Prices under the circumstances are largely nominal and are quoted at $25@$26 per ton, bulk at works. Natural cake is quoted at $30@$31 per ton at producing points but freight rates are against much demand from eastern markets.

Tin Oxide—The reduction in price as announced last week is still effective and leading sellers continue to offer at 45c. per lb. No change in price was made on tin crystals or bichloride of tin for August deliveries.

Alcohol

Several parcels of butyl alcohol arrived at New York last week from foreign ports. The market for alcohol was inactive, so far as new business was concerned, but prices for all descriptions ruled steady. Denatured was quotably unchanged at 38c. per gal., in drums, for the special No. 1 formula. Ethyl spirits, U.S.P., 190 proof, held at $4.75 @$4.80 per gal. Methanol was offered at $1.18 per gal., 95 per cent grade, and $1.20 per gal. for the 97 per cent material.

Financial Notes

The Corn Products Refining Company for the 6 months ending June 30, 1923, shows net income of $6,076,590. This is equivalent, after deduction of preferred dividends to $10.46 a share earned on the $49,784,000 outstanding common stock.

The Vanadium Corp, of America reports net income of $387,131 for the 6 months ending June 30. This is equivalent to $1.03 per share earned on 373,334 shares of no par capital stock.

For the first half of the year, the Ajax Rubber Co., shows a profit of $414,720 which compares with a profit of $191,536 for the corresponding period last year.

National Lead Co., has declared regular quarterly dividends of 2 per cent on the common stock and 1¾ per cent on the preferred stock. Common dividend is payable September 29 to stock of record September 14 and the preferred September 15 to stock of record August 24.

The National Enameling & Stamping Co., earned at the rate of $6 a share on the 155,918 shares of common stock, during the first half of the year.

E. I. du Pont de Nemours & Co., for 6 months ended June 30, reports net income of $10,125,882, equivalent after debenture stock dividends to $8.54 a share earned on $95,060,900 outstanding common stock. Profit and loss surplus June 30 was $42,917,559, an increase of $5,265,349 being recorded since December 31, 1922.

Coal-Tar Products

General Reduction in Salicylates—Phenol Under Pressure—Benzene Irregular in Quiet Market—Solvent Naphtha Steady

THE FEATURE was the reduction in prices for salicylates. Leading producers lowered prices from 5@10c. per lb. to bring the market a little more in line with phenol. Trading has been quiet for some time now and it was no secret that certain producers stood ready to cut prices in order to bring in business. In fact the undertone was barely steady after the reduction was put through as no important trading developed. Consumers look for no improvement in the situation until the market for phenol settles down to a steadier basis. Small lots of spot phenol, U.S.P. quality, sold at 30c. per lb., with futures entirely nominal, being subject to negotiation where long time contracts enter into consideration. Some handlers of benzene were inclined to take a firmer stand on the market, based on reports that 30 blast furnaces were taken off during the month of July. Unless new business in the steel industry assumes larger proportions the demand for coke will meet with further curtailment and production of benzene will naturally suffer. However, up to the close, various prices were named for benzene and the market was a more or less nominal affair. Naphthalene was quotably unchanged, with the undertone easy on lack of buying. Creslyic acid was offered freely on spot and keen competition tends to unsettle prices. Solvent naphtha appears to be sold up and steady prices were the rule on forward business. Export inquiry for coal-tar products was moderate only.

Aniline Oil and Salt—Producers continued to hold out for 16c. per lb., carload basis, but second-hands were credited with shading the market on aniline oil. Demand was quiet. Salt was offered at 23@24c. per lb., immediate shipment.

Beta-Naphthol—Demand was limited to small lots and prices were irregular, ranging from 21@22½c. per lb.

Benzene—Developments in the iron and steel industry are receiving close attention. The producers of benzene predict that the output will be reduced as a result of the closing down of so many blast furnaces. As matters now stand the distribution of benzene in motor fuel channels is going on at a fair rate because of the fact that much of this business is put over on a contract basis, the price depending largely upon the prevailing market for gasoline. Stocks of benzene are not so large today as a month ago and an open reduction in prices is not anticipated. The nominal quotation for the 90 per cent material held at 25c. per gal., tanks, f.o.b. works, but it was intimated that this figure could be shaded in several quarters.

Creosote—Domestic production is well sold up and the market is a nominal affair so far as prices go. Advices from Manchester, England, reported dull business, but asking prices on creosote oil held around 9@9½c. per gal., loose, f.o.b. works.

Cresylic Acid—Prices heard in the local trade covered a wide range, especially for spot material. One handler held out for $1 per gal. on the 97 per cent material, claiming extra light color. Others were sellers at 90c. per gal., with the market barely steady. On contract domestic producers held out for 75@78c. per gal., according to reports.

Naphthalene—Small lots of white flake sold on spot at 6¾c. per lb. On ball the market stood around 7@7¼c. per lb., immediate shipment, with business dull. Chips were offered at 4¾@5c. per lb., carload basis, f.o.b. Philadelphia. Crude for shipment from the other side was offered at 2½@2⅝c. per lb., c.i.f. New York, these prices obtaining for high grade stock. On off grade material 2c. could have been done.

Phenol—The market was irregular, with the undertone easy. Trading was along routine lines only. U.S.P. phenol on spot sold at 30c. per lb., with nearby material available at concessions. On futures nominal quotations ranged from 25@28c. per lb. It is understood that favored buyers could secure phenol on a long time contract at concessions.

Salicylic Acid—Producers lowered the market for U.S.P. acid, immediate shipment, to 35c. per lb. In some instances this price represents a reduction of 5c. from the previous trading level, while in others it represents a cut of 10c. per lb. Demand did not improve after the reduction and with no change for the better in the phenol situation the undertone was anything but steady. Sodium salicylate was reduced to 40c. per lb.

Solvent Naphtha—The market ruled steady on meager offerings, production in most directions being well sold up.

Larger Wool Clip Predicted

A wool clip of 228,031,000 lb. for 1923 was predicted in the preliminary estimate issued last week by the Department of Agriculture. This exceeds the 220,155,000 lb. clip of 1922 and the 223,062,000 lb. clip of 1921, but is below the clip of 1920, which was 235,005,000 lb., and still further below that of 1919, with 249,658,000 lb.

Dye Standards Report Ready

It is expected that the dye standards as finally established by the Treasury Department, will be issued very soon. These standards will be used in assessing duties on imported dyes, the strength of the dyes being judged by the standards as evolved by the Treasury Department. It is stated that the work of drawing up the regulations has been completed and they will be announced without delay.

Cease and Desist Order for Cosmetic Manufacturer

The Federal Trade Commission has issued a cease and desist order directed to Prichard & Constance, Inc., of New York City, a manufacturer of cosmetics and toilet articles. The order requires the concern to discontinue various co-operative methods of fixing and controlling prices at which its products shall be sold.

The methods used by the respondent in carrying into effect its system of resale price maintenance and which are specifically prohibited in the commission's order are: Giving or offering to give special discounts, bonuses or terms of sale, to jobbers or retailers, conditional upon their observance of or promise to observe the resale prices fixed by respondent. Contracting or entering into agreements or understandings with jobbers or retailers, providing for the maintenance of such prices. Co-operating with its customers in establishing or maintaining a system of resale prices. Utilizing any other co-operative means, directly or indirectly, to bring about the maintenance of the resale prices fixed by respondent.

Latest Quotations on Industrial Stocks

	Last Week	This Week
Air Reduction	64	•63
Allied Chem. & Dye	66	64
Allied Chem. & Dye pfd	108	107
Am. Ag. Chem.	•14	12
Am. Ag. Chem. pfd	34	30¾
American Cotton Oil	6⅝	5½
American Cotton Oil pfd	17½	16½
Am. Drug Synd	5	4½
Am. Linseed Co.	21	18
Am. Linseed pfd	42	40
Am. Smelting & Refining Co.	56½	54½
Am. Smelting & Refining pfd.	96¾	95¼
Archer-Daniels Mid. Co., w.i.	28	25
Archer-Daniels Mid. Co. pfd.	94	92
Atlas Powder (new)	52	51½
Casein Co. of Am.	•60	•60
Certain-Teed Products	26	•26
Commercial Solvents "A"	34	•32
Corn Products	121	119½
Corn Products pfd	120	•118
Davison Chem.	31	27½
Dow Chem. Co.	•42	•42
Du Pont de Nemours	119½	115½
Du Pont de Nemours db	83	83
Freeport-Texas Sulphur	11⅜	10¾
Glidden Co.	8	8
Grasselli Chem.	•132	•132
Grasselli Chem. pfd	•105	•105
Hercules Powder	•105	•105
Hercules Powder pfd	•104	•102
Heyden Chem.	1⅞	1¾
Int'l Ag. Chem. Co.	3	2½
Int'l Ag. Chem. pfd.	8	6½
Int'l Nickel	13	12¼
Int'l Nickel pfd.	•80	79½
Int'l Salt	•78	•83
Mathieson Alkali	43½	38½
Merck & Co.	83	•83
National Lead	115	112
National Lead pfd.	111	•110½
New Jersey Zinc	154	•154
Parke, Davis & Co.	•79	79
Pennsylvania Salt	•80	•81
Procter & Gamble	•128	•128
Sherwin-Williams	29	28½
Sherwin-Williams pfd.	•102	•101
Tenn. Copper & Chem.	9½	8¾
Texas Gulf Sulphur	57½	57
Union Carbide	55	54
United Drug	80	77
U. S. Industrial Alcohol	49	46¾
U. S. Industrial Alcohol pfd.	•101	•100
Va.-Car Chem. Co.	9	9
Va.-Car Chem. pfd.	24⅜	24

•Nominal. Other quotations based on last sale.

Vegetable Oils and Fats

Soapers Take on Round Lot of Coconut—Cottonseed and Linseed Irregular—Tallow Holds Steady

THERE was some activity in the market for coconut oil and it was reported that 15,000 tons of Ceylon type oil sold for future delivery, soapers in the West being the principal buyers. According to trade authorities three consumers took part in the buying and the price was in the neighborhood of 7½c. per lb., f.o.b. Pacific coast shipping points. Another feature in the vegetable oil market was the cotton condition report which was very much below expectations and brought out a flurry in refined cottonseed oil options. Linseed oil showed no improvement so far as business was concerned, but futures were not so easy as a week ago. Crude corn oil was higher. Tallow was quotably unchanged.

Cottonseed Oil—On Wednesday the Department of Agriculture issued its report on the condition of the cotton crop as of July 25. The condition was placed at 67.2 per cent of normal, which compares with 69.9 per cent of normal a month ago. The decline in condition came as a surprise to the trade for every one of the private estimates issued within the past week or so indicated improvement in the condition of the crop. Prices for oil advanced on Wednesday, but subsequent weakness in lard, together with rather quiet trading in cash products, brought out renewed pressure. Traders regarded the official report as too pessimistic. With condition at 67.2 per cent the crop is estimated at 11,516,000 bales. In explaining the cut in the official figures the Department pointed to the dry weather in Texas and the ravages of the boll weevil in Georgia. August refined oil, in the option market, settled around 9.80c., with October at 8.88c. and December at 8.30c. per lb. Late August shipment crude was offered at 7½c. per lb., buyers' tanks, f.o.b. mills, Texas. September crude was nominal at 6¾@7c. per lb., with October forward at 6½@6¾c. per lb. Bleachable oil was offered at 8¼@8⅝c. per lb., buyers' tanks, f.o.b. Texas common points. Lard compound was available at 11¾@12¼c. per lb., carload basis, f.o.b. New York, the price depending upon the seller.

Linseed Oil—There was trading in spot oil at 97c. per gal., in cooperage, carload lots, which compares with 98c. a week ago. September delivery oil was offered at 93c. per gal., with October at 89c. per gal. and November forward at 83c. per gal. Interest in distant deliveries was more in the nature of sounding the market for not much business was placed. Prices were irregular all week and several crushers intimated that the market could be shaded on a firm bid. Duluth seed prices steadied toward the close on buying by crushers in both the October and November positions. The weather in the flaxseed area was less favorable and this brought out some support from the speculative element. Argentine seed, on the other hand, was unsettled and there were offerings at $2.05 per bu., c.i.f. New York. At Buenos Aires August seed, in the option market, was offered at $1.82½ per bu. Easier exchange and lower freights favored American buyers. Estimates on the amount of old crop seed still available for export from the Argentine range from 4,000,000 to 10,000,000 bu.

China Wood Oil—There were offerings of August shipment from the Pacific coast at 22c. per lb., carload basis. Spot oil was available in New York at 23c., with the market unsettled on lack of important buying.

Coconut Oil—Transactions in Ceylon type oil, involving fully 15,000 tons, were closed about a week ago. Two soapers and one nut butter maker were credited with the buying and shipments will commence in September and extend through to the end of March. So far as could be learned most of the oil was sold by crushers located on the Pacific coast, but Philippine producers also took a hand in the selling. The price paid was in the neighborhood of 7½c. per lb., coast basis. Prices steadied after this news circulated around in the trade, but just before the close there were additional offerings at 7½c., f.o.b. coast, with no buyers.

Corn Oil—Sales of crude oil were reported at 7⅞c. per lb., tank cars, f.o.b. point of production, an advance of ¼c. per lb.

Olive Oil Foots—Prime green foots were offered at 8¼c. per lb., immediate delivery. The trade was quiet.

Palm Oils—Cables were easier, but this failed to induce buying. Lagos for shipment settled at 7¼@7½c. per lb., as to position. One lot of 25 tons of Lagos on spot sold at 7c. per lb. Niger settled at 6¾@6¾c. per lb., according to seller and delivery.

Soya Bean Oil—Distressed material was around the market and this unsettled prices. First-hands continued to quote soya bean oil at 8¾@9c., sellers' tanks, duty paid, f.o.b. New York. On the coast the market settled around 8¼c. per lb.

Menhaden Oil—Fishing returns were less favorable, but in the absence of buying orders prices were more or less nominal around 40c. per gal., crude, tank cars, f.o.b. fish factory.

Oleo Stearine — Business was put through at prices ranging from 9¾@10c. per lb., the outside figure prevailing towards the close.

Tallow—Several parcels of extra special tallow sold at 6⅝c. per lb., ex-plant, the price being unchanged compared with the previous trading level.

Grease—Yellow grease was available at 5⅝@5¾c. per lb.

Miscellaneous Materials

Barytes—Lithopone makers are taking usual requirements and this tends to steady prices. Producers quote $8@$10 per ton on the crude, $16@$20 per ton on the ground white, and $28@$29 per ton on the floated, carload basis, f.o.b. St. Louis.

Casein—There were sellers of low grade casein at 14c. per lb. In some quarters the inside price was nearer 15½c. per lb. Supplies have increased and imported material was particularly plentiful. Demand was routine only.

Glycerine—Chemically pure glycerine was offered at 16@16½c. per lb., in drums, the inside figure obtaining for carload lots, nearby positions. Demand for the C.P. was quiet. Dynamite was firm because of the recent buying together with the firmer position of crude. There were bids for dynamite at 15½c. per lb., carload basis, with sellers asking from 15¾@16½c. per lb. Soap-lye crude, loose, was steady at 10¾c. bid, and 11¼c. asked. No sales in crude were reported. Saponification, basis 88 per cent, closed nominally at 12¼@12½c. per lb., loose, f.o.b. point of production.

Naval Stores—Trading showed no improvement and with advices from the south less encouraging prices here eased off. Turpentine was offered at 95c. per gal., which compares with 98c. per gal. a week ago. Scattered lots changed hands on this basis. Export business was slow, according to reports from primary markets. Rosins met with only routine call and prices were barely steady, the lower grades settling at $5.75@$5.80 per bbl.

Shellac—A slightly firmer undertone featured the market last week, prices advancing from 1@2c. per lb. Spot holdings were light, according to traders, and the quantity afloat appears to be in good hands. Foreign markets underwent little change. Trading here was along routine lines only. T.N. settled at 54@55c. per lb. Superfine orange was raised to 60c. per lb. Bleached, bonedry, closed at 65@66c. per lb.

Lithopone—Producers maintained prices on the carload basis of 7c. per lb., in bags, nearby positions. Business was inactive.

White Lead—The steadier position of the metal brought out a better feeling in the market for the lead pigments. Corroders say that business has been satisfactory. Pig lead was raised recently to the basis of 6½c. per lb., f.o.b. New York, which compares with 6c. per lb., the low of a month ago. Standard dry white lead in casks held at 9¼c. per lb. Red lead, dry, in casks, was offered by leading producers at 11¼c. per lb. Litharge closed at 10⅜c. per lb., round-lot basis.

Zinc Oxide—American process, lead free, was unchanged at 8c. per lb., carload basis. French process, red seal, was offered by first hands at 9⅜c. per lb. Green seal closed at 10⅜c. per lb.

Imports at the Port of New York

July 27 to Aug. 2

ACIDS—Cresylic—5 dr., Glasgow, Order; 114 dr., Hamburg, Order; 50 dr., Glasgow, B. & O. R.R. **Tartaric**—100 bbl., Genoa, L'Appula Soc. Per l'Industria Chimica. **Phosphorus**—84 cs., Hamburg, W. A. Brown & Co.

ALUMINUM SILICUM—161 bbl., Genoa, U. S. Steel Products Co.

ALCOHOL—9 dr. amyl, Rotterdam, National Dispatch Co.; 3 bbl. amyl, Hamburg, Mattin Chemical Co.; 1 bbl. isobutyl, Hamburg, Roessler & Hasslacher Chemical Co.; 28 csk. butyl, Bordeaux, Commercial Solvents Corp.; 200 dr. denat'd., Aresibo, Order.

AMMONIUM CARBONATE — 12 csk., Hamburg, W. Schall & Co.

AMMONIUM MURIATE—40 bbl., Hamburg, E. Suter & Co.

ANTIMONY REGULUS—400 cs., Shangsha, C. F. Smillie & Co.; 500 cs., Shangsha, Harshaw, Fuller & Goodwin; 500 cs., Shangsha, Hoyt Metal Co.; 250 cs., Hankow, Order.

ANTIMONY OXIDE—250 cs., Shangsha, Harshaw, Fuller & Goodwin; 100 cs., Shangsha, Rare Metals Products Co.; 50 cs., Shangsha, Union Trust of Hudson County.

ANTIMONY SULPHIDE—25 cs., London, F. B. Vandegrift & Co.

ARSENIC — 300 cs. arsenic, Kobe, A. Klipstein & Co.; 400 cs., Kobe, Takata & Co.; 300 cs. Kobe, S. W. Bridges & Co.; 250 cs., Yokohama, Chipman Chemical Engineering Co.; 150 cs., Yokohama, Meteor Products Co.; 100 csk., Hamburg, Central Union Trust Co.; 100 bbl., Tampico, Am. Smelting & Refining Co.

BARIUM SUPEROXIDE — 223 csk., Hamburg, W. A. Brown & Co.

BARYTES—100 bg., Hamburg, Cooper & Cooper; 700 bg., Genoa, Bankers Trust Co.; 300 bg., Bremen, N. Y. Trust Co.

BARIUM CHLORIDE — 68 csk., Hamburg, Innis, Speiden & Co.

BARIUM NITRITE—40 csk., Hamburg, Roessler & Hasslacher Chemical Co.

BRONZE POWDER—13 cs., Bremen, B. F. Drakenfeld & Co.; 24 cs., Bremen, Gerstendorfer Bros.

CALCIUM ARSENATE—75 csk., Hamburg, Order.

CALCIUM CHLORIDE — 94 dr., Hamburg, Bank of America; 603 dr., Hamburg, Philipp Bauer & Co.

CAMPHOR—100 cs. crude, Shanghai, Importers & Traders Nat'l Bank; 500 cs. refined, Kobe, Suzuki & Co.

CASEIN—152 bg., Hamburg, Bank of the Manhattan Co.; 188 bg., St. Nazaire, E. B. Muns; 532 bg., Bordeaux, Martin Cantine; 835 bg., Buenos Aires, International Accept. Bank.

CHEMICALS—16 bbl., Hamburg, Vitro Mfg. Co.; 12 cs., Hamburg, Merck & Co.; 2 cs., Hamburg, Order; 168 bg., Glasgow, Brown Bros. & Co.; 560 bg., Glasgow, Trumpy, Faesy & Besthoff; 56 csk., Hamburg, C. B. Richard & Co.; 150 csk., Hamburg, Innis, Speiden & Co.; 600 bg., Glasgow, Brown Bros. & Co.; 280 bg., Glasgow, Truempy, Faesy & Besthoff.

CHINA CLAY — 1,062 tons, Fowey, Papermakers Import Co.; 1,621 tons, Fowey, J. W. Higman & Co.; 1,266 tons, Fowey, Baring Bros. & Co.

COLORS—5 csk. vermilion, Southampton, Order; 24 cs. paste, Hamburg, H. A. Metz & Co.; 9 csk. aniline, Hamburg, Franklin Import & Export Co.; 6 bbl. aniline, Genoa, Am. Aniline Products Co.; 7 bbl. aniline, Genoa, Bachmeier & Co.; 72 cyl. aniline, Havre, Sandoz Chemical Works; 3 cs., Hamburg, Franklin Import & Export Co.; 2 csk. dry, Hamburg, H. A. Metz & Co.; 34 csk., Hamburg, E. C. Foster; 10 csk., Hamburg, Order; 36 pkg. aniline, Havre, Geigy Co.; 39 pkg. do., Havre, Sandoz Chemical Works; 35 csk. dry, Bremen, M. G. Lange Co.

COPPER OXIDE — 50 dr., Hamburg, Roessler & Hasslacher Chemical Co.

COPRA—115 bg., St. Anns Bay, Franklin Baker & Co.; 580 bg., Morant Bay, Franklin Baker & Co.

DIVI-DIVI—22 bg., Curacao, Paris & Co.; 1,521 bg., Maracaibo, Suzarte & Whitney.

FUSEL OIL—38 bbl., Hamburg, Continental Shipping Co.; 4 csk., Hamburg, Irving Bank-Col. Trust Co.; 20 csk., Hamburg, Order.

FERRO-CHROME—300 cs., Havre, International Ores & Metals Selling Corp.; 14 csk., Gothenburg, D. Heydeman.

FERRO-MANGANESE — 50 cs., Havre, Courcy Browne.

GLAUBER SALT — 250 bg., Hamburg, Roessler & Hasslacher Chemical Co.

GUMS—59 pkg. copal, Manila, Determan & Co.; 50 cs. damar, Batavia, Seaboard National Bank; 800 cs. damar, Batavia, Order; 577 pkg. copal, Macassar, L. C. Gillespie & Sons; 429 pkg. copal, Macassar, Innes & Co.; 153 pkg. copal, Macassar, France, Campbell & Darling; 283 pkg. copal, Macassar, Paterson, Boardman & Knapp; 140 bg. copal, Singapore, Kidder, Peabody & Co.; 70 bg. copal, Singapore, Order; 103 pkg. kadaya, Bombay, Order; 346 pkg. karaya, Bombay, Order; 57 cs. tragacanth, Bombay, Order.

HEXAMETHYLENE—10 cs., Hamburg, Seaboard National Bank.

LIME BORATE—6,518 bg., Mejillones, Pacific Coast Borax Co.

LITHOPONE—80 csk., Hamburg, Bankers Trust Co.

LOGWOOD EXTRACT—185 bbl., Haiti, Logwood Mfg. Corp.

MANGROVE BARK — 1,000 bg., Singapore, Roberts, Evans & Woodhead.

MINERAL BLACK—107 csk., Hamburg, Ladenburg, Thalmann & Co.

MYROBALANS — 10,930 pkt., Calcutta, Bingham & Co.; 2,666 bg., Bombay, Order.

MAGNESIUM CHLORIDE—74 dr., Hamburg, P. Tausig & Sons.

MANGANESE ORE—400 tons, Mandingo, J. H. Popham.

NAPHTHALENE—112 bbl., Glasgow, Order; 319 bg., Rotterdam, W. E. Jordan & Bros.; 319 bg., Rotterdam, Order; 55 bbl., Hamburg, U. S. Navigation Co.; 955 bg., Hamburg, Pacific Chemical Co.

OILS—Cod—5 csk., St. Johns, Order; 700 bbl., Kobe, Cook & Swan Co. **China Wood**—300 bbl., Hankow, Mitsui & Co.; 145 cs. do., Hankow, Sino Java Hvg.; 284 csk., Hankow, Irving Bank-Col. Trust Co.; 100 dr., London, Order. **Olive Oil Foots**—250 bbl., Naples, Order. **Sperm**—30 bbl., Glasgow, Order. **Seal**—200 csk., St. Johns, Bowring & Co. **Soya Bean**—1,190 tons (bulk), Dairen, Order.

OIL SEEDS—Castor—1,000 bg., Santos, Central Union Trust Co.; 1,166 bg., Santos, Baker Castor Oil Co.; 9,561 bg., Cocanada, Order. **Linseed**—8,653 bg., Buenos Aires, L. Dreyfus & Co.

PHOSPHORUS—300 csk., Havre, W. E. Miller.

PLUMBAGO—344 bbl., Bombay, Battery Park National Bank.

POTASSIUM SALTS—4,250 bg. muriate, 1,000 bg. sulphate and 7,999 bg. manure salt, Hamburg, Potash Importing Corp. of Am.; 20 cs. bromide, Hamburg, Order; 18 dr. permanganate, Hamburg, E. I. Du Pont De Nemours & Co.; 5 csk. metabisulphite, Hamburg, R. W. Greeff & Co.; 202 dr. caustic, 58 csk. do. and 50 dr. permanganate, Hamburg, A. Klipstein & Co.; 46 csk. salts, Hamburg, Roessler & Hasslacher Chemical Co.; 578 bbl. alum, Hamburg, Order; 8 cs. caustic, Gothenburg, Baldwin Universal Co.; 38 csk. carbonate, Bremen, Order.

PYRIDINE — 6 dr., Hamburg, R. W. Greeff & Co.

QUEBRACHO—3,407 bg., Buenos Aires, Fourth Atlantic Nat'l Bank of Boston.

SAL AMMONIAC—75 csk., Hamburg, A. Klipstein & Co.; 97 csk., Hamburg, National American Bank; 29 csk., Hamburg, P. Bauer & Co.

SHELLAC—279 bg., Calcutta, Philadelphia National Bank; 450 bg., Calcutta, Chase National Bank; 300 bg. refuse, Calcutta, Bank of the Manhattan Co.; 2,108 bg., Calcutta, Order.

SILVER SULPHIDE—14 cs., Pacasmayo, W. R. Grace & Co.; 4 cs., Pacasmayo, South Am. Metal Co.

STRONTIUM NITRATE—50 csk., Hamburg, Jungmann & Co.

SODIUM SALTS — 10,847 bg. nitrate, Iquique, E. I. Du Pont de Nemours Co.; 120 cs. cyanide, Havre, Hardy & Ruperti; 26 cs. cyanide, Havre, Meteor Products Co.; 2 bg. phosphate, Hamburg, Maltus & Ware; 125 csk. sulphate, Hamburg, E. M. Sergeant & Co.; 3,319 bg. nitrate, Antofagasta, W. R. Grace & Co.; 7,819 bg. nitrate, Iquique, W. R. Grace & Co.; 13 keg acetate, Rio de Janeiro, A. Klipstein & Co.; 5,063 bg. and 247 csk. nitrate, Christiania, Order.

STARCH — 250 bbl. potato, Rotterdam, Order.

SUMAC—20 csk. extract, Galsgow, Am. Dyewood Co.

SIENNA—270 bg. Leghorn, F. B. Vandegrift & Co.; 112 bbl., Leghorn, Order.

TALC — 55 bg., Genoa, Bankers Trust Co.; 500 bbl., Genoa, C. Mathieu.

WAXES—344 bg. carnauba, Para, Philadelphia National Bank; 32 pkg. bees, Santiago, D. Steengrafe; 6 bg. bees, Ponce, D. Steengrafe; 1,200 bg. paraffine, London, Order.

XYLENE—8 dr., Rotterdam, Lunham & Moore.

ZINC CHLORIDE—100 csk., Hamburg, A. Klipstein & Co.

Imports of Dyes at New York During June

Imports for consumption through the Port of New York, July 1923, of dyes, synthetic aromatic chemicals, medicinals, pharmaceuticals, and other coal tar products in paragraphs 27 and 28 of the Tariff Act of 1922. According to information compiled by the Bureau of Foreign and Domestic Commerce.

The imports of coal tar dyes for July totaled 144,687 pounds, with an invoice value of $142,428. The following table shows the monthly imports through the Port of New York for the year 1923.

Month	Lb.	Value
*January	179,309	$185,344
February	191,709	199,690
March	312,809	301,436
April	242,022	256,751
May	261,869	292,340
June	247,174	257,803

*Not complete.

The five dyes leading in quantity imported were Ciba Bordeaux B, Hydron Pink FF, Sulphoncyanine Black, Trisulphon Brown 2 G, and Erio Green B. Of the total quantity imported in July 1923, 46 per cent came from Switzerland, 43 per cent from Germany, 9 per cent from Italy, 1 per cent from England, and 1 per cent from elsewhere.

The imports of synthetic aromatic chemicals for July totaled 5,821 pounds, with an invoice value of $12,208. The imports of medicinals, photographic developers, and other coal tar chemicals for July totaled 122,073 pounds with an invoice value of $31,748.

The designation "c" for competitive and "nc" for noncompetitive indicates the appraisement basis for the assessment of the ad valorem duty in paragraph 28 of the Tariff Act of 1922. Those dyes without designation are doubtful, pending further investigation. The ad valorem rate for competitive dyes is based on the American selling price, as defined in subdivision (f) of section 402 of title IV; the ad valorem rate for noncompetitive dyes is based on the United States value, as defined in subdivision (d) of section 402 of title IV of the Tariff Act of 1922.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums	lb.	$0.25 – $0.25½
Acid, acetic, 28%, bbl.	100 lb.	3.38 – 3.50
Acetic, 56%, bbl.	100 lb.	6.75 – 7.00
Acetic, 80%, bbl.	100 lb.	9.58 – 9.83
Glacial, 99½%, bbl.	100 lb.	12.00 – 12.78
Acetic anhydride, 85%, dr.	lb.	.38 – ....
Boric, bbl.	lb.	.10½– ....
Citric, kegs	lb.	.49 – .52
Formic, 85%	lb.	.12 – .14
Gallic, tech.	lb.	.45 – .50
Hydrofluoric, 52%, carboys	lb.	.11 – .12
Lactic, 44%, tech., light, bbl.	lb.	.11½– .12
22% tech., light, bbl.	lb.	.05½– .06
Muriatic, 18° tanks	100 lb.	.90 – 1.00
Muriatic, 20°, tanks, 100 lb.		1.00 – 1.10
Nitric, 36°, carboys	lb.	.04½– .05
Nitric, 42°, carboys	lb.	.06 – .06½
Oleum, 20%, tanks	ton	18.50 – 19.00
Oxalic, crystals, bbl.	lb.	.12½– .12¾
Phosphoric, 50% carboys	lb.	.07½– .08½
Pyrogallic, resublimed	lb.	1.50 – 1.60
Sulphuric, 60°, tanks	ton	11.00 – 12.00
Sulphuric, 60°, drums	ton	13.00 – 14.00
Sulphuric, 66°, tanks	ton	15.00 – 16.00
Sulphuric, 66° drums	ton	20.00 – 21.00
Tannic, U.S.P., bbl.	lb.	.65 – .70
Tannic, tech., bbl.	lb.	.45 – .50
Tartaric, imp., powd., bbl.	lb.	.34 – .35
Tartaric, domestic, bbl.	lb.	.37½– ....
Tungstic, per lb.	lb.	1.10 – 1.20
Alcohol, butyl, drums, f.o.b. works	lb.	.26 – .28
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.78 – ....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.75 – ....
Alcohol, methyl (see Methanol)		
Alcohol, denatured, 190 proof		
No. 1, special bbl.	gal.	.44 – ...
No. 1, 190 proof, special, dr.	gal.	.38 – ...
No. 1, 188 proof, bbl.	gal.	.45 – ...
No. 1, 188 proof, dr.	gal.	.39 – ...
No. 5, 188 proof, bbl.	gal.	.43 – ...
No 5, 188 proof, dr.	gal	.37 – ...
Alum, ammonia, lump, bbl.	lb.	.03½– .03¾
Potash, lump, bbl.	lb.	.03 – .04½
Chrome, lump, potash, bbl.	lb.	.06 – .07
Aluminum sulphate, com., bags	100 lb.	1.40 – 1.50
Iron free bags	lb.	2.40 – 2.50
Aqua ammonia, 26°, drums	lb.	.07 – .07½
Ammonia, anhydrous, cyl.	lb.	.30 – .30½
Ammonium carbonate, powd. casks, imported	lb.	.09½– .10
Ammonium carbonate, powd. domestic, bbl.	lb.	.13 – .14
Ammonium nitrate, tech., casks	lb.	.10 – .11
Amyl acetate tech., drums	gal.	4.50 – 4.75
Arsenic, white, powd., bbl.	lb.	09½– .10½
Arsenic, red, powd., kegs	lb.	.15 – .15½
Barium carbonate, bbl.	ton	65.00 – 70.00
Barium chloride, bbl.	ton	80.00 – 83.00
Barium dioxide, drums	lb.	.18 – .18½
Barium nitrate, casks		.08 – .08½
Blane fixe, dry, bbl.	lb.	.04 – .04¼
Bleaching powder, f.o.b. wks., drums	100 lb.	1.75 – ....
Spot N. Y. drums	100 lb.	2.00 – 2.20
Borax, bbl.	lb.	.05½– .05¾
Bromine, cases	lb.	.28 – .30
Calcium acetate, bags	100 lb.	4.00 – 4.05
Calcium arsenate, dr.	lb.	.11½– .14½
Calcium carbide, drums	lb.	.05½– .05½
Calcium chloride, fused, drums	ton	22.00 – 23.00
Gran. drums	ton	28.00 – 30.00
Calcium phosphate, mono, bbl.	lb.	.06½– .07
Camphor, cases	lb.	.86 – .88
Carbon bisulphide, drums	lb.	.07 – .07½
Carbon tetrachloride, drums	lb.	.09¼– .10
Chalk, precip.—domestic, light, bbl.	lb.	.04½– .04¾
Domestic, heavy, bbl.	lb.	.03½– .03¾
Imported, light, bbl.	lb.	.04½– .05
Chlorine, liquid, tanks, wks.	lb.	.05½– .05½
Cylinders, 100 lb., wks	lb.	.06 – .06½
Cylinders, 100 lb., spot	lb.	.09 – ....
Chloroform, tech., drums	lb.	.35 – .38
Cobalt oxide, bbl.	lb.	2.10 – 2.25
Copperas, bulk, f.o.b. wks.	ton	19.00 – 20.00
Copper carbonate, bbl.	lb.	.18 – .19
Copper cyanide, drums	lb.	.47 – .50
Coppersulphate, dom., bbl.,	100 lb.	5.35 – ....
Imp. bbl.	100 lb.	4.50 – 4.75
Cream of tartar, bbl.	lb.	.25 – .26
Epsom salt, dom., tech., bbl.	100 lb.	1.75 – 2.00
Epsom salt, imp., tech., bags	100 lb.	.90 – 1.00
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.00 – 2.50
Ether, U.S.P., resale, dr.	lb.	.13 – .15
Ethyl acetate, 85%, drums	gal.	.80 – .81
Ethy acetate, lether, 98% to 100%)	gal.	$0.95 – $1.00
Formaldeayde, 40%, bbl.	lb.	.14 – .14½
Fullers earth—imp., powd., net	ton	30.00 – 32.00
Fusel oil, ref., drums	gal.	.... – ....
Fusel oil, crude, drums	gal.	3.75 – 4.00
Glaubers salt, wks., bags	100 lb.	1.20 – 1.40
Glaubers salt, imp., bags	100 lb.	.90 – .95
Glycerine, c.p., drums extra	lb.	.16 – .16½
Glycerine, dynamite, drums	lb.	.15½– .15¾
Glycerine, crude 80%, loose	lb.	.11 – .11½
Iodine, resublimed	lb.	4.55 – 4.65
Iron oxide, red, casks	lb.	.12 – .18
Lead:		
White, basic carbonate, dry, casks	lb.	.09½– .09½
White, basic sulphate, casks	lb.	.08½– .09
White, in oil, kegs	lb.	.11½– .11½
Red, dry, casks	lb.	.10½– .11½
Red, in oil, kegs	lb.	.13 – .14½
Lead acetate, white crys., bbl.	lb.	.14 – .14½
Brown, broken, casks	lb.	.13 – .13½
Lead arsenate, powd., bbl.	lb.	.20 – .21
Lime-Hydrated, bbl.	per ton	16.80 – 17.00
Lime, Lump, bbl.	280 lb.	3.63 – 3.65
Litharge, comm., casks	lb.	.10½– .10½
Lithophone, bags	lb.	.07 – .07½
in bbl.	lb.	.07½– .07½
Magnesium carb., tech., bags	lb.	.08 – .08½
Methanol, 95%, bbl.	gal.	1.18 – 1.20
Methanol, 97%, bbl.	gal.	1.20 – 1.22
Methyl-acetone, t'ks.	gal.	1.15 – ....
Nickel salt, double, bbl.	lb.	.10½– ....
Nickel salts, single, bbl.	lb.	.11½– ....
Phosgene	....	.60 – .75
Phosphorus, red, cases	lb.	.... – ....
Phosphorus, yellow, cases	lb.	.35 – .40
Potassium bichromate, casks	lb.	.10½– .11
Potassium bromide, gran., bbl.	lb.	.19 – .20
Potassium carbonate, 80-85%, calcined, casks	lb.	.06½– .06¾
Potassium chlorate, powd.	lb.	.07 – .08½
Potassium cyanide, drums	lb.	.47 – .52
Potassium, first sorts, cask	lb.	.08 – .08¼
Potassium hydroxide (caustic potash) drums	lb.	.07½– .09
Potassium iodide, cases	lb.	3.65 – 3.75
Potassium nitrate, bbl.	lb.	.06½– .07½
Potassium permanganate, drums	lb.	.16½– .17½
Potassium prussiate, red, casks	lb.	.64 – .65
Potassium prussiate, yellow, casks	lb.	.34 – ...
Salammoniac, white, gran, casks, imported	lb.	.05½– .06
Salammoniac, white, gran., b'bl., domestic	lb.	.07½– .07½
Gray, gran., casks	lb.	.08 – .09
Salsoda, bbl.	100 lb.	1.20 – 1 40
Salt cake (bulk)	ton	26.00 – 28.00
Soda ash, light, 58% flat, bags, contract	100 lb.	1.45 – 1.50
Soda ash, light, 58%, flat, bags, resale	100 lb.	1.70 – 1. 75
Soda ash, dense, bags, contract, basis 58%	100 lb.	1.51 – ....
Soda ash, dense, in bags, resale	100 lb.	1.85 – 1.90
Soda, caustic, 76%, solid, drums	100 lb.	3.16½– ....
Soda, caustic, ground and flake, contracts	100 lb.	3.60 – 3.85
Soda, caustic, ground and flake, resale	100 lb.	3.72½– ....
Sodium acetate, works, bags	lb.	.05½– .05¾
Sodium bicarbonate, bbl.	100 lb.	2.00 – 2.50
Sodium bichromate, casks	lb.	.07½– .08
Sodium bisulphate (niter cake)	ton	6.00 – 7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½– .04½
Sodium chlorate, kegs	lb.	.06½– .07
Sodium chloride	long ton	12.00 – 13.00
Sodium cyanide, cases	lb.	.19 – .22½
Sodium fluoride, bbl.	lb.	$0.08½ – $0.10½
Sodium hyposulphite, bbl.	lb.	.02½– .03
Sodium nitrite, casks	lb.	.07½– .07½
Sodium peroxide, powd., cases	lb.	.28 – .30
Sodium phosphate, dibasic, bbl.	lb.	.03½– .04
Sodium prussiate, yel. drums	lb.	.13½– .14½
Sodium salicylic, drums	lb.	.40 – .45
Sodium silicate (40°, drums)	100 lb.	.75 – 1.15
Sodium silicate (60°, drums)	100 lb.	1.75 – 2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03 – .04
Sodium sulphite, crys., bbl.	lb.	.03½– .03½
Strontium nitrate, powd., bbl.	lb.	.10 – .11
Sulphur chloride, yel drums	lb.	.04½– .05
Sulphur, crude	ton	18.00 – 20.00
At mine, bulk	ton	16.00 – 18.00
Sulphur, flour, bag	100 lb.	2.25 – 2.35
Sulphur, roll, bag	100 lb.	2.00 – 2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 – .08½
Talc—imported, bags	ton	30.00 – 40.00
Talc—domestic powd., bags	ton	18.00 – 25.00
Tin bichloride, bbl.	lb.	.11½– .12
Tin oxide, bbl.	lb.	.45 – ....
Tin crystals, bbl.	lb.	.30½– .31
Zinc carbonate, bags	lb.	.14 – .14½
Zinc chloride, gran, bbl.	lb.	.06½– .06½
Zinc cyanide, drums	lb.	.37 – .38
Zinc oxide, , lead free, bbl.	lb.	.08 – .08½
5% lead sulphate, bags	lb.	.07½– ....
10 to 35 % lead sulphate, bags	lb.	.07 – ....
French, red seal, bags	lb.	.09½– ....
French, green seal, bags	lb.	.10½– ....
French, white seal, bbl.	lb.	.12 – ....
Zinc sulphate, bbl.	100 lb.	2.50 – 3.00

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 – $0.70
Alpha-naphthol, ref., bbl.	lb.	.68 – .80
Alpha-naphthylamine, bbl.	lb.	.34 – 36
Aniline oil, drums	lb.	.16 – .16½
Aniline salts, bbl.	lb.	.23 – .24
Anthracene, 80%, drums	lb.	.75 – 1.00
Anthracene, 80%, imp., drums, duty paid	lb.	.70 – .75
Anthraquinone, 25%, paste, drums	lb.	.70 – .75
Benzaldehyde U.S.P., carboys	lb.	1.50 – ....
tech, drums	lb	75 ....
Benzene, pure, water-white, tanks and drums	gal.	.27 – .32
Benzene, 90%, tanks & drums	gal.	.25 – .30
Benzidine base, bbl.	lb.	.80 – .85
Benzidine sulphate, bbl.	lb.	.70 – .75
Benzoic acid, U.S.P., kegs	lb.	.75 – 80
Benzoate of soda, U.S.P., bbl.	lb.	.57 – .65
Benzyl chloride, 95-97%, ref., drums	lb.	.45 – ....
Benzyl chloride, tech., drums	lb.	.30 – ..35
Beta-naphthol, tech., bbl.	lb.	.21 – .22
Beta-naphthylamine, tech.	lb.	.80 – .90
Cresol, U.S.P., drums	lb.	.25 – .29
Ortho-cresol, drums	lb.	.28 – .32
Cresylic acid, 97%, resale, drums	gal.	.90 – 1.00
95-97%, drums, resale	gal.	.85 – .90
Dichlorbenzene, drums	lb.	.07 – .09
Diethylaniline, drums	lb.	.50 – .60
Dimethylaniline, drums	lb.	.41 – .42
Dinitrobenzene, bbl.	lb.	.19 – .20
Dinitroclorbenzenee bbl.	lb.	.22 – .23
Dinitronaphthalen, bbl.	lb.	.30 – .32
Dinitrophenol, bbl.	lb.	.35 – .40
Dinitrotoluene, bbl.	lb.	.20 – .22
Dip oil, 25%, drums	gal.	.25 – .30
Diphenylamine, bbl.	lb.	.50 – .52
H-acid, bbl.	lb.	.75 – .80
Meta-phenylenediamine, bbl.	lb.	1.00 – 1.05
Michlers ketone, bbl.	lb.	3.00 – 3.50
Monochlorbenzene, drums	lb.	.08 – .10
Monoethylaniline, drums	lb.	.95 – 1.10
Naphthalene, flake, bbl.	lb.	.07 – .07½
Naphthalene, balls, bbl.	lb.	.07½– .07½
Naphthionate of soda, bbl.	lb.	.58 – .65
Naphthionic acid, crude, bbl.	lb.	.52 – .55
Nitrobensene, drums	lb.	.10 – .12
Nitro-naphthalene, bbl.	lb.	.30 – .35
Nitro-toluene, drums	lb.	.13½– .14½
N-W acid, bbl.	lb.	1.25 – 1.30
Ortho-amidophenol, kegs	lb.	2.30 – 2.35
Ortho-dichlorbenzene, drums	lb.	.17 – .20
Ortho-nitrophenol, bbl.	lb.	.90 – .92
Ortho-nitrotoluene, drums	lb.	.10 – .12
Ortho-toluidine, bbl.	lb.	.13½– .14½
Para-amidophenol, base, kegs	lb.	1.20 – 1.30
Para-amidophenol, HCl, kegs	lb.	1.25 – 1.35
Para-dichlorbenzene, bbl.	lb.	.17 – .20
Paranitroaniline, bbl.	lb.	.68 – .72
Para-nitrotoluene, bbl.	lb.	.60 – .65
Para-phenylenediamine, bbl.	lb.	1.45 – 1.50
Para-toluidine, bbl	lb.	.90 – .95
Phthalic anhydride, bbl.	lb.	.35 – .38
Phenol, U.S.P., dr.	lb.	.30 – .35
Picric acid, bbl.	lb.	.20 – .22
Pyridine, dom., drums	gal.	nominal

Pyridine, imp., drums	gal.	$3.80 –	$3.90
Resorcinol, tech., kegs	lb.	1.50 –	1.60
Resorcinol, pure, kegs	lb.	2.25 –	....
R-salt, bbl.	lb.	.55 –	.60
Salicylic acid, tech., bbl.	lb.	.32 –	....
Salicylic acid, U.SP., bbl.	lb.	.35 –	....
Solvent napthha, water-white, tanks	gal.	.27 –	....
Crude, tanks	gal.	.24 –	....
Sulphanilic acid, crude, bbl.	lb.	.18 –	.20
Thiocarbanilide, kegs	lb.	.35 –	.38
Toluidine, kegs	lb.	1.20 –	1.30
Toluidine, mixed, kegs	lb.	.30 –	.35
Toluene, tank cars	gal.	.30 –	.32
Toluene, drums	gal.	.34 –	.36
Xylidines, drums	lb.	.49 –	.50
Xylene, pure, drums	gal.	.65 –	.70
Xylene, com., drums	gal.	.37 –	.....
Xylene, com., tanks	gal.	.32 –	.....

Naval Stores

Rosin B-D, bbl. 280 lb.		$5.75 –	$5.80
Rosin E-I, bbl. 280 lb.		5.95 –	
Rosin K-N, bbl. 280 lb.		6.00 –	6.10
Rosin W.G.-W.W., bbl. 280 lb.		6.25 –	7.25
Wood rosin, bbl. 280 lb.		5.90 –	6.00
Turpentine, spirits of, bbl.	gal.	.94½ –	....
Wood, steam dist., bbl.	gal.	.75 –	....
Wood, dest. dist., bbl.	gal.	.60 –	....
Pine tar pitch, bbl. 200 lb.		..... –	6.00
Tar, kiln burned, bbl. 500 lb.		..... –	12.00
Retort tar, bbl. 500 lb.		..... –	11.50
Rosin oil, first run, bbl.	gal.	.40 –	.....
Rosin oil, second run, bbl.	gal.	.45 –	.....
Rosin oil, third run, bbl.	gal.	.50 –	.....
Pine oil, steam dist.	gal.	.70 –	.....
Pine oil, pure, dest. dist.	gal.	.65 –	.....
Pine tar oil, ref.	gal.	.48 –	.....
Pine tar oil, crude, tanks f.o.b. Jacksonville, Fla.	gal.	.32 –	.32½
Pine tar oil, double ref., bbl.	gal.	..... –	.75
Pine tar, ref., thin, bbl.	gal.	..... –	.25
Pinewood creosote, ref., bbl.	gal.	..... –	.52

Animal Oils and Fats

Degras, bbl.	lb.	$0.03½ –	$0.04½
Grease, yellow, bbl.	lb.	.05½ –	.06
Lard oil, Extra No. 1, bbl.	gal.	.80 –	.85
Neatsfootoil, 20 deg. bbl.	gal.	1.28 –	1.30
No. 1, bbl.	gal.	.92 –	.94
Oleo Stearine		.10 –	.....
Red oil, distilled, d.p. bbl.	lb.	.08½ –	.09½
Saponified, bbl.	lb.	.08½ –	.09½
Tallow, extra, loose	lb.	.06½ –	.....
Tallow oil, acidless, bbl.	gal.	.86 –	.88

Vegetable Oils

Castor oil, No. 3, bbl.	lb.	$0.13½ –	.....
Castor oil, No. 1, bbl.	lb.	.14 –	.....
Chinawood oil, bbl.	lb.	.22 –	.23
Cocoanut oil, Ceylon, bbl.	lb.	.09 –	.09½
Ceylon, tanks, N.Y.	lb.	.08 –	.08½
Cocoanut oil, Cochin, bbl.	lb.	.09½ –	.09¾
Corn oil, crude, bbl.	lb.	.09½ –	.....
Crude, tanks, (f.o.b. mill)	lb.	.07½ –	.....
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.07½ –	.08
Summer yellow, bbl.	lb.	.10½ –	.11
Winter yellow, bbl.	lb.	.11½ –	.12
Linseed oil, raw, car lots, bbl.	gal.	.97 –	.....
Raw, tank cars (dom.)	gal.	.92 –	.....
Boiled, cars, bbl. (dom.)	gal.	.99 –	.....
Olive oil, denatured, bbl.	gal.	1.10 –	1.12
Sulphur, (foots) bbl.	lb.	.08½ –	.08¾
Palm, Lagos, casks	lb.	.07 –	.07½
Niger, casks	lb.	.06½ –	.06¾
Palm kernel, bbl.	lb.	.08½ –	.08¾
Peanut oil, crude, tanks (mill)	lb.	.10½ –	.....
Peanut oil, refined, bbl.	lb.	.14 –	.14½
Perilla, bbl	lb.	.15½ –	.15½
Rapeseed oil, refined, bbl.	gal.	.76½ –	.77½
Rapeseed oil, blown, bbl.	gal.	.82 –	.....
Sesame, bbl.	lb.	.11½ –	.11½
Soya bean (Manchurian), bbl.	lb.	.10 –	.....
Tank, f.o.b. Pacific coast	lb.	.08½ –	.....
Tank, (f.o.b. N.Y.)	lb.	.09 –	.09½

Fish Oils

Cod, Newfoundland, bbl.	gal.	$0.63 –	.....
Menhaden, light pressed, bbl.	gal.	.65 –	.....
White bleached, bbl.	gal.	.68 –	.....
Blown, bbl.	gal.	.72 –	.....
Crude, tanks (f.o.b. factory)	gal.	.40 –	.....
Whale No. 1 crude, tanks, coast	lb.	..... –	.....
Winter, natural, bbl.	gal.	.76 –	.78
Winter, bleached, bbl.	gal.	.79 –	.80

Oil Cake and Meal

Cocoanut cake, bags	ton	$26.00 –	$28.00
Copra, sun dried, bags, (e.i.f.)	lb.	.04½ –	.05
Sun dried Pacific coast	lb.	.04½ –	....
Cottonseed meal, f.o.b. mills	ton	38.00 –	....
Linseed cake, bags	ton	35.00 –	36.00
Linseed meal, bags	ton	37.00 –	38.00

Dye & Tanning Materials

Albumen, blood, bbl.	lb.	$0.45 –	$0.50
Albumen, egg, tech, kegs	lb.	.95 –	.97
Cochneal, bags	lb.	.33 –	.35
Cutch, Borneo, bales	lb.	.04½ –	.04½
Cutch, Rangoon, bales	lb.	.13 –	.13½
Dextrine, corn, bags 100 lb.		3.79 –	4.06
Dextrine, gum, bags 100 lb.		4.14 –	4.34
Divi-divi, bags	ton	38.00 –	39.00
Fustic, sticks	ton	30.00 –	35.00
Fustic, chips, bags	lb.	.04 –	.05
Logwood, sticks	ton	26.00 –	30.00
Logwood, chips bags	lb.	.02½ –	.03½
Sumac, leaves, Sicily, bags	ton	75.00 –	80.00
Sumac, ground, bags	ton	$70.00 –	$72.00
Sumac, domestic, bags	ton	40.00 –	42.00
Starch, corn, bags 100 lb.		3.22 –	3.49
Tapioca flour, bags	lb.	.07 –	.07½

Extracts

Archil, cone., bbl.	lb.	$0.18 –	$0.22
Chestnut, 25% tannin, tanks	lb.	.02 –	.03
Divi-divi, 25% tannin, bbl.	lb.	.04 –	.05
Fustic, crystals, bbl.	lb.	.20 –	.22
Fustic, liquid, 42°, bbl.	lb.	.08 –	.09
Gambier, liq., 25% tannin, bbl.	lb.	.08 –	.09
Hematine crys., bbl.	lb.	.14 –	.18
Hemlock, 25% tannin, bbl.	lb.	.03½ –	.04½
Hypernic, solid, drums	lb.	.24 –	.26
Hypernic, liquid, 51°, bbl.	lb.	.09½ –	.10½
Logwood, crys., bbl.	lb.	.17 –	.18
Logwood, liq., 51°, bbl.	lb.	.08½ –	.09
Quebracho, solid, 65% tannin, bbl.	lb.	.04½ –	.05
Sumac, dom., 51°, bbl.	lb.	.06½ –	.07

Dry Colors

Blacks–Carbongas, bags, f.o.b. works, spot	lb.	$0.17 –	$0.21
Lampblack, bbl.	lb.	.12 –	.40
Mineral, bulk	ton	35.00 –	45.00
Blues–Bronze, bbl.	lb.	.55 –	.60
Prussian, bbl.	lb.	.55 –	.60
Ultramarine, bbl.	lb.	.08 –	.35
Browns, Sienna, Ital., bbl.	lb.	.06 –	.14
Sienna, Domestic, bbl.	lb.	.03½ –	.04
Umber, Turkey, bbl.	lb.	.04 –	.04½
Greens–Chrome, C.P. Light, bbl.	lb.	.32 –	.34
Chrome, commercial, bbl.	lb.	.12 –	.12½
Paris, bulk	lb.	.25 –	.28
Reds, Carmine No. 40, tins	lb.	4.50 –	4.70
Oxide red, casks	lb.	.10 –	.14
Para toner, kegs	lb.	1.00 –	1.10
Vermilion, English, bbl.	lb.	1.20 –	1.25
Yellow, Chrome, C.P. bbls.	lb.	.20 –	.21
Ocher, French, casks	lb.	.02½ –	.03

Waxes

Bayberry, bbl.	lb.	$0.28 –	$0.29
Beeswax, crude, bags	lb.	.21 –	.21½
Beeswax, refined, light, bags	lb.	.32 –	.34
Beeswax, pure white, cases	lb.	.40 –	.41
Candelilla, bags	lb.	.20 –	.21
Carnauba, No. 1, bags	lb.	.41 –	.42
No. 2, North Country, bags	lb.	.23 –	.23½
No. 3, North Country, bags	lb.	.17½ –	.18½
Japan, cases	lb.	.15½ –	.16
Montan, crude, bags	lb.	.04½ –	.05
Paraffine, crude, match, 105-110 m.p.	lb.	.04 –	.04½
Crude, scale 124-126 m.p., bags	lb.	.02½ –	.03
Ref., 118-120 m.p., bags	lb.	.03 –	.03½
Ref., 125 m.p., bags	lb.	.03½ –	.03½
Ref., 128-130 m.p., bags	lb.	.03½ –	.03½
Ref., 133-135 m.p., bags	lb.	.04½ –	.04½
Ref., 135-137 m.p., bags	lb.	.05½ –	.05½
Stearic acid, agle pressed, bags	lb.	.12½ –	.12½
Double pressed, bags	lb.	.12½ –	.13
Triple pressed, bags	lb.	.14½ –	.14½

Fertilizers

Ammonium sulphate, bulk, f.o.b. works 100 lb.		$3.20 –	$3.25
F.a.s. double bags 100 lb.		3.50 –	3.55
Blood, dried, bulk	unit	4.00 –	.....
Bone, raw, 3 and 50, ground	ton	27.00 –	30.00
Fish scrap, dom., dried, wks.	unit	3.75 –	.....
Nitrate of soda, bags 100 lb.		2.45 –	2.52½
Tankage, high grade, f.o.b. Chicago unit		3.40 –	3.50
Phosphate rock, f.o.b. mines, Florida pebble, 68-72%	ton	$4.00 –	$4.50
Tennessee, 78-80%	ton	8.00 –	8.25
Potassium muriate, 80%, bags	ton	34.55 –	.....
Potassium sulphate, bags basis 90%	ton	43.67 –	.....
Double manure salt	ton	25.72 –	.....
Kainit	ton	7.22 –	.....

Crude Rubber

Para—Upriver fine	lb.	$0.26 –	.....
Upriver coarse	lb.	.23 –	.....
Upriver caucho ball	lb.	.23½ –	.....
Plantation—First latex crepe	lb.	.27½ –	.....
Ribbed smoked sheets	lb.	.27½ –	.....
Brown crepe, thin, clean	lb.	.26½ –	.....
Amber crepe No. 1	lb.	.27 –	.....

Gums

Copal, Congo, amber, bags	lb.	$0.12½ –	$0.13½
East Indian, bold, bags	lb.	.23 –	.23½
Manila, pale, bags	lb.	.20 –	.20½
Pontinak, No. 1 bags	lb.	.20 –	.20½
Damar, Batavia, cases	lb.	.27½ –	.28½
Singapore, No. 1, cases	lb.	.32 –	.33
Singapore, No. 2, cases	lb.	.23½ –	.24
Kauri, No. 1, cases	lb	.68 –	.70
Ordinary chips, cases	lb.	.22½ –	.23½
Manjak, Barbados, bags	lb	.09 –	.09½

Shellac

Shellac, orange fine, bags	lb.	$0.58 –	.....
Orange superfine, bags	lb.	.60 –	.....
A. C. garnet, bags	lb.	.59 –	.....
Bleached, bonedry	lb.	.66 –	.....
Bleached, fresh	lb.	.54 –	.....
T. N., bags	lb.	.54 –	.55

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b.; Quebec sh. ton		$500.00 –	.....
Asbestos, shingle, f.o.b., Quebec sh. ton		$65.00 –	$85.00
Asbestos, cement, f.o.b., Quebec sh. ton		10.00 –	14.00
Barytes, grd., white, f.o.b. mills, bbl. net ton		16.00 –	20.00
Barytes, grd., off-color, f.o.b. mills bulk net ton		13.00 –	15.00
Barytes, floated, f.o.b. St. Louis, bbl. net ton		28.00 –	.....
Barytes, crude f.o.b. mines, bulk net ton		8.00 –	10.00
Casein, bbl., tech. lb.		.14 –	.15
China clay (kaolin) crude, f.o.b. Ga. net ton		6.00 –	8.00
Washed, f.o.b. Ga. net ton		8.00 –	9.00
Powd., f.o.b. Ga. net ton		14.00 –	20.00
Crude f.o.b. Va. net ton		6.00 –	8.00
Ground, f.o.b. Va. net ton		13.00 –	19.00
Imp., lump, bulk net ton		15.00 –	20.00
Imp., powd. net ton		45.00 –	50.00
Feldspar, No. 1 pottery long ton		7.50 –	.....
No. 2 pottery long ton		6.00 –	.....
No. 1 soap long ton		8.50 –	.....
No. 1 Canadian, f.o.b. mill long ton		18.00 –	20.00
Graphite, Ceylon, lump, first quality, bbl. lb.		.06 –	.06½
Ceylon, chip, bbl. lb.		.04½ –	.05
High grade amorphous crude ton		15.00 –	30.00
Gum arabic, amber, sorts, bags lb.		.14½ –	.15
Gum tragacanth, sorts, bags lb.		.48 –	.56
No. 1, bags lb.		1.50 –	1.60
Kieselguhr, f.o.b. Cal. ton		40.00 –	42.00
F.o.b. N. Y. ton		50.00 –	55.00
Magnesite, crude, f.o.b. Cal. ton		14.00 –	15.00
Pumice stone, imp., casks lb.		.03 –	.05½
Dom., lump, bbl. lb.		.05 –	.05½
Dom., ground, bbl. lb.		.05½ –	.06
Silica, glass sand, f.o.b. Ind. ton		2.00 –	2.50
Silica, sand blast, f.o.b. Ind. ton		2.50	5.00
Silica, amorphous, 250-mesh, f.o.b. Ill. ton		17.00 –	17.50
Silica, glass sand, f.o.b. Ill. ton		1.50 –	3.00
Soapstone, coarse, f.o.b. Vt., bags ton		7.00 –	8.00
Talc, 200 mesh, f.o.b., Vt., bags ton		6.50 –	9.00
Talc, 200 mesh, f.o.b. Ga., bags ton		7.00 –	9.00
Talc, 200 mesh, f.o.b. Los Angeles, bags ton		18.00 –	20.00

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$2.75 –	.....
Corning	bbl.	1.60 –	.....
Cabell	bbl.	1.50 –	.....
Somerset	bbl.	1.40 –	.....
Illinois	bbl.	1.67 –	.....
Indiana	bbl.	1.68 –	.....
Kansas and Oklahoma, 28 deg.	bbl.	1.20 –	.....
California, 35 deg. and up	bbl.	.83 –	.....

Gasoline, Etc.

Motor gasoline, steel bbls.	gal.	$0.20½ –	.....
Naphtha, V. M. & P. deod, steel bbls.	gal	.19½ –	.....
Kerosene, ref. tank wagon	gal.	.14 –	.....
Bulk, W. W. export	gal.	.06½ –	.....
Lubricating oils:			
Cylinder, Penn., dark	gal.	.20 –	.22
Bloomless, 30@31 grav.	gal.	.18½ –	.20½
Paraffin, pale	gal.	.24 –	.26
Spindle, 200, pale	gal.	.21 –	.22
Petrolatum, amber, bbls.	lb.	.05 –	.05½
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140–145
Chrome brick, f.o.b. Eastern shipping points	ton	50–52
Chrome cement, 40-50% Cr_2O_3	ton	23–27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks.	1,000	45–47
2nd. quality, 9-in. shapes, f.o.b. wks.	1,000	41–43
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65–68
9-in. arches, wedges and keys	ton	80–85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	53–55
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	53–55
F.o.b. Mt. Union, Pa.	1,000	45–47
Silicon carbide refract. brick, 9-in.	1,000	1,100.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N. Y.	ton	$200.00 –	$225.00
Ferrochromium, per lb. of Cr, 6-8% C	lb.	.07 –	.08
4-6% C	lb.	.10 –	.12
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	117.50 –	.....
Spiegeleisen, 19-21% Mn.	gr. ton	45.00 –	47.00
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 –	2.50
Ferrosilicon, 10-15%	gr. ton	43.00 –	50.00
50%	gr. ton	77.50 –	.....
75%	ton	135.00 –	155.00

Ferrotungsten, 70-80%, per lb. of W	lb.	$0.85 - $0.95
Ferro-uranium, 35-50% of U. per lb. of U	lb.	3.50 - 4 50
Ferrovanadium, 30-40%, per lb. of V	lb.	3.50 - 4 50

Ores and Semi-finished Products

Bauxite, dom. crushed dried, f.o.b. shipping points	ton	$5.50 - $8.75
Chrome ore Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 - 23.00
C.i.f. Atlantic seaboard	ton	21.00 - 25.00
Coke, fdry., f.o.b. ovens	ton	5.25 - 5.75
Coke, furnace, f.o.b. ovens	ton	4.50 - 5.00
Fluorspar, gravel, f.o.b. mines' Illinois	ton	23.50 - .....
Ilmenite, 52% TiO_2	lb.	.01½- .01¾
Manganese ore, 50% Mn c.i.f. Atlantic seaport	unit	.35 -.....
Manganese ore, chemica (MnO_2)	ton	80.00 - 85.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.65 - .70
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 - .08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½- .12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.11½- .12
Pyrites, dom. fines, f.o.b. mines, Ga	unit	.12
Rutile, 95% TiO_2	lb.	.12 -.....
Tungsten, scheelite, 60% WO_3 and over	unit	8.75 - 9.00
Tungsten, wolframite, 60% WO_3	unit	8.50 - 8.75
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 - 3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	2.25 - 2.50
Vanadium pentoxide, 99%	lb.	12.00 - 14.00
Vanadium ore, per lb. V_2O_5	lb.	.75 - 1.00
Zircon, washed, iron free, f.o.b. Pablo, Fla.	lb.	.02 - .10

Non-Ferrous Materials

	Cents per Lb.
Copper, electrolytic	14½- ...
Aluminum, 98 to 99%	26-27½
Antimony, wholesale, Chinese and Japanese	7½- 8½
Nickel, virgin metal	27-29
Nickel, ingot and shot	30-32
Monel metal, shot and blocks	32.00
Monel metal, ingots	38.00
Monel metal, sheet bars	45.00
Tin, 5-ton lots, Straits	38.00
Lead, New York, spot	6 50
Lead, E. St. Louis, spot	6.60
Zinc, spot, New York	6.55
Zinc, spot, E. St. Louis	6.20

Other Metals

Silver (commercial)	oz.	$0.62¾
Cadmium	lb.	1.00
Bismuth (500 lb. lots)	lb.	2.55
Cobalt	lb.	3.00-3.25
Magnesium, ingots, 99%	lb.	1.25-.....
Platinum	oz.	116.00
Iridium	oz.	275.00@300.00
Palladium	oz.	80.00
Mercury	75 lb.	66.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	25.75
Copper bottoms	30.50
Copper rods	23 50
High brass wire	20.00
High brass rods	18.00
Low brass wire	21.75
Low brass rods	22.00
Brazed brass tubing	24.25
Brazed bronze tubing	28.50
Seamless copper tubing	27 00
Seamless high brass tubing	25.50

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

Copper, heavy and crucible	10.25@10.50
Copper, heavy and wire	11 50@11.75
Copper, light and bottoms	10.25@10.50
Lead, heavy	5.00@ 5.25
Lead, tea	3.00@ 3.25
Brass, heavy	6.25@ 6.50
Brass, light	5.25@ 5.50
No. 1 yellow brass turnings	6.00@ 6.25
Zinc scrap	3.50@ 3.75

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.64	$3.64
Soft steel bars	3.54	3.54
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.39	4.39
Plates, ¼ to 1 in. thick	3.64	3.64

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Arizona

AJO—The New Cornelia Copper Co. is advancing construction work on its new flotation plant, and plans to have the first unit equipped and ready for service early in October. The plant will be used for the treating of sulphide ores, and is expected to double the copper production.

California

LOS ANGELES—The Pan-American Petroleum & Transport Co. is pushing construction on the initial unit of its new oil refining plant in the harbor district and plans to commence operations in the near future. The refinery will have an ultimate capacity of 25,000 bbl. per day, with storage and distributing facilities to handle close to 7,000,000 bbl. It will represent an investment in excess of $6,000,000. E. L. Doheny is chairman of the board.

SACRAMENTO — The Sacramento Pipe Works, 7th and R Sts., will soon break ground for the construction of a 1-story plant, 100x150 ft., at 16th and North B Sts., for the production of steel, cast and wrought-iron pipe products. It will cost approximately $55,000.

Georgia

NORCROSS—Fire, July 18, destroyed the tanning plant of Shadburn Brothers, Inc., with loss estimated at approximately $75,000, with equipment. It is planned to rebuild.

Illinois

LAWRENCEVILLE—The Indian Refining Co. has commenced the installation of additional equipment at its local refining plant, for the production of gasoline. It is purposed to provide 8 new units.

Indiana

JEFFERSONVILLE—The Philadelphia Quartz Co., 121 South 3rd St., Philadelphia, Pa., has tentative plans under consideration for the construction of a new 1- and 2-story plant, on site selected at Jeffersonville, for the production of silicate of soda and kindred products.

EVANSVILLE—The Board of Water Commissioners has authorized the preparation of plans for the construction of an addition to the municipal filtration plant, to provide for an increase in capacity from 12,000,000 to 18,000,000 gals. per day, estimated to cost $250,000.

LAWRENCEBURY—The South Bend Oil Co., South Bend, is considering plans for the construction of a new oil refinery on local site. Details and estimated cost are being determined.

EVANSVILLE—The Hedderick Brothers Co. has construction in progress on a new 1-story foundry, 60x60 ft., for the manufacture of brass products.

VALPARAISO—The Cook Laboratories, Inc. Chicago, Ill., is said to be arranging for the lease of property at Valparaiso, for the establishment of a new plant for the manufacture of chemical products. Henry K. Brown, Valparaiso, is president.

Kansas

EL DORADO—The Industrial Refining Co., Wichita, Kan., has acquired the local oil refining plant of the St. Louis Oil & Refining Co. The new owner plans for extensions and improvements, including the installation of equipment for increased production, and will commence operations at an early date.

Kentucky

LOUISVILLE—The Louisville Gas & Electric Co. has plans in preparation for the construction of a new gas purification plant, and purposes to call for bids at an early date.

Louisiana

MONROE—The Union Power Co. Inc., Shreveport, recently organized, has plans under way for the construction of a new carbon black manufacturing plant, and auxiliary natural gas works, on site selected at Monroe The initial plant will have a capacity of 3,000 tons per annum, and is estimated to cost approximately $1,000,000, with machinery. The company is disposing of a bond issue in the amount noted to provide fund for the project. F. T. Whited, vice-president, Frost-Johnson Lumber Co., Shreveport, is president of the new organization. Frank J. Silsbee is vice-president and general manager. W. W. Moore, Houston, Tex., is treasurer.

Maryland

CUMBERLAND—The Baltimore & Ohio Railroad, Baltimore, has plans in progress for extensions and improvements in its creosoting and timber-preserving plant at Green Spring, near Cumberland, estimated to cost $115,000. Considerable additional equipment will be installed, including a retort, used for treating ties; generator; air compressors; tanks, etc. It is purposed to increase the output about 50 per cent.

BALTIMORE—The Porcelain Enamel & Mfg. Co., Eastern Ave., 23rd to 25th Sts., has awarded a general contract to the P. C. Street Engineering Co., 406 St. Paul St., for the construction of a new plant unit to cost about $250,000, including machinery. The structure will replace a portion of the plant in another section of the city, destroyed by fire a number of months ago. Heinrich Turk is president.

BALTIMORE—The National Wall Paper Co., 1011 East Baltimore St., has awarded a general contract to the Pecken-Ricoff Co., 403 North Broadway, for the construction of a new 4-story and basement plant, 45x155 ft., to be equipped for wall paper production, estimated to cost about $85,000. George R. Callis, Jr., 611 American Bldg., is architect.

Massachusetts

WORCESTER—The American Steel & Wire Co. has filed plans and will commence the immediate erection of a new 1-story building, to be equipped as an annealing works, located on Kansas St. It will cost close to $40,000.

Michigan

DETROIT—The Michigan Copper & Brass Co., 5851 West Jefferson St., will commence the construction of a new 2-story addition to cost about $40,000.

BAY CITY—Plans are being perfected by the Chevrolet Motor Co., for the construction of a new 1-story addition, to be equipped as a heat-treating works.

DETROIT—The Great Western Smelting & Refining Co., Chicago, Ill., has construction in progress on a new smelting plant on Russell St., near Woodland Ave. It will be equipped for handling, grading and smelting of non-ferrous metals and is expected to be ready for service by the close of the year. The plant will cost in excess of $90,000. Albert Kahn, 1000 Marquette Bldg., Detroit, is architect.

Mississippi

JACKSON—The Mississippi Cotton Oil Co. Inc., has been chartered under Delaware laws with capital of $100,000, to take over and expand the local plant of the company of the same name, recently acquired by J. W. Tuberville and George W. Covington, who will head the new organization. Tentative plans are being considered for extensions and improvements.

Missouri

ST. LOUIS—The Kettle River Treating Co., recently organized under Illinois laws, with capital of $750,000, will be owned and operated by the Western Tie & Timber Co., Syndicate Trust Bldg., St. Louis. The new company will take over the existing plant of the Kettle River Co., at Madison, Ill., and will improve and operate the prop-

erty for the creosoting of ties and other timber.

NEWBERN—The local plant of the American Agricultural Chemical Co., recently referred to as resuming operations for the manufacture of fertilizer products, has been in continuous service for some time past and no immediate change is contemplated. Production will be developed on a basis of more than 15,000 tons of material a year, as previously stated.

Montana

LEWISTOWN—The local oil refinery of the Lewistown Oil & Refining Co., has been acquired by new interests, which purpose to organize a company to expand and operate the plant. The refinery has a present rating of about 1500 bbl. per day.

New Jersey

NEWARK—The Gebhard Mfg. Co., 9 East Fairmount Ave., manufacturer of glass boxes, etc., has purchased property at 688-90 South 16th St., as a site for a new plant, estimated to cost in excess of $25,000, with machinery. Plans will be prepared at an early date. Louis and Charles Gebhard head the company.

New York

COHOES—The Little Falls Fibre Co., Little Falls, has tentative plans under consideration for the construction of a new local plant, to be 2-story, 60x140 ft., estimated to cost approximately $100,000, including equipment. It is purposed to remove the present Cohoes works to the new building.

LONG ISLAND CITY—The Sun Match Corp., 120 Liberty St., New York, has leased a 1-story factory on VanAlst Ave., near Harris Ave., totaling about 10,000 sq.ft., for a new plant. Immediate possession will be taken.

North Carolina

SELMA—The Carolina Pole Co. has plans in progress for the construction of a new pole-treating and creosoting plant on the Cullowhee Road, estimated to cost about $100,000, including equipment. I. H. Powell is president; and J. L. Dillard, secretary. The latter will be in charge of the plant.

Ohio

POMEROY—The Brocalsa Chemical Co. has acquired the local plant of the Buckeye Salt Works, at a public sale, for a consideration of $164,000. The new owner purposes to operate the property and will make extensions and improvements. The capacity will be increased.

Oklahoma

CYRIL—The Anderson-Pritchard Oil Corp. will commence the installation of additional equipment at its local refinery for the production of gasoline. The expansion will cost close to $100,000, including equipment.

Oregon

PRINEVILLE—A. G. Goodwin, Prineville, is interested in a project to construct and operate a local beet sugar refinery, to cost in excess of $500,000, including machinery. It is expected to develop an initial output of about 400 tons per day. A company is being organized with a capital of $1,500,000, and will maintain offices at Portland.

Pennsylvania

PHILADELPHIA—The Savannah Chemical Co., Dickinson and 37th Sts., manufacturer of fertilizers, etc., has tentative plans for the rebuilding of the portion of its plant, destroyed by fire, July 21, with loss estimated at $100,000, including equipment.

LEWISTOWN—The Pennsylvania Wire Glass Co., Pennsylvania Bldg., Philadelphia, has plans nearing completion for the construction of its proposed new plant on local site, acquired a number of months ago. It will be equipped for the manufacture of plain and corrugated wire glass, and is estimated to cost in excess of $200,000, including equipment. Bids will soon be asked. The company is now operating a plant at Dunbar, Pa.

Tennessee

KNOXVILLE—Chamberlain & Stewart, Inc., 505 Burwell Bldg., will take bids about Aug. 15, for equipment for a local sheet asphalt plant, comprising pug mills, mechanical dryers, heaters, oil distributing system, etc. A structure has been leased for the proposed works. Fred W. Chamberlain is head.

CLEVELAND—M. L. Beard and W. J. Harris, both of Cleveland, are planning for the organization of a company to install and operate a local plant for the manufacture of fertilizer products.

Texas

HOUSTON—The Southwestern Graphite Co., Burnett, Tex., will establish and operate a local grinding and refining plant on Lyons Ave., designed for an initial output of 15,000 lb. of graphite per day, estimated to cost about $150,000, including equipment.

HOUSTON—The Board of Trustees, Rice Institute, has awarded a general contract to the Telepsen Construction Co., Houston, for the erection of a new chemical laboratory, estimated to cost about $450,000. Work will be placed under way at once. William W. Watkin, Houston, is architect.

WACO—The Industrial Cotton Oil Co., recently organized with a capital of $100,000, will take over and operate the local plant of the American Cotton Oil Co., which has been secured for a consideration said to be $100,000. Plans are under consideration for extensions and improvements. W. D. Kyser, Marlin, Tex., is president of the new company; J. M. Ford, Waco, is vice-president and general manager.

Virginia

NORFOLK—The Norfolk Sugar Refining Co. Inc., organized a number of months ago to construct and operate a local refinery, will soon commence work on the initial plant unit, for which a contract has been awarded to the Eastwick Engineering Co., 342 Madison Ave., New York. The unit will have a capacity of 500 tons per day, and will cost in excess of $3,000,000, with power house and other mechanical buildings. J. B. Morgan, Southern Produce Bldg., Norfolk, and H. B. Calwell, head the company.

Washington

VANCOUVER—The Columbia River Paper Mills Corp. has awarded a contract to the Austin Co., Cleveland, O., for the construction of a new addition, 80x500 ft., estimated to cost approximately $125,000. The structure will be equipped for sulphite and paper-manufacturing departments.

West Virginia

DUNBAR—The Dunbar Flint Glass Corp., recently organized with a capital of $125,000, has authorized plans for the construction of a new local plant for the manufacture of chimneys and kindred thin glass products. It will consist of a main 1-story building, 50x120 ft., and 40x120 ft. J. M. Payne, Jr., is president.

New Companies

NIAGARA AMMONIA CO., New York, N. Y.; chemical products; $600,000. Incorporators: R. Bennett, Jr., F. Poppe and W. J. Ryan. Representative: F. Knorr, attorney, Albany, N. Y.

PHILLIPS RUBBER CO., INC., Boston, Mass.; rubber products; $50,000. Oliver P. Hussey, Nashua, N. H., is president and treasurer.

UNITED STATES ELECTRIC PORCELAIN CO., Trenton, N. J.; electrical porcelain products; $100,000. Incorporators: John Janusz, Ignacz and M. A. Wisnieski, 504 North Clinton Ave., Trenton. The last noted is representative.

NATIONAL SPEEDWAY REFINING CO., Philadelphia, Pa.; oils, greases, etc.; $100,000. Incorporators: W. G. Snyder, Joseph Handler and M. B. Kunis, all of Philadelphia. Representative: W. W. Smith, attorney, Wilmington, Del.

FISHER-SMITH MFG. CO., INC., East Orange, N. J.; boiler compounds and kindred products; $100,000. Incorporators: H. Earl Fisher and A. Weston Smith, Jr. Representative: New Jersey Registration & Trust Co., 525 Main St., East Orange.

VICTORY FERTILIZER CO., Boston, Mass.; fertilizer products; $50,000. Myron L. Jackson, president; Herman W. Shaw, Danbury, N. H., treasurer and representative.

UNITED MILLS CO., 72 Chestnut St., Newark, N. J.; disinfectants, insecticides, etc.; organized. Philip S. March, 143 Clinton Ave., is head.

THORNTON OIL & REFINING CO., Houston, Tex.; refined petroleum products; $100,000. Incorporators: P. B. Thornton, Jr., C. N. Phillips, and J. H. Burkett, all of Houston.

MOTOL LUBRICANTS CORP., Dover, Del.; lubricating oils, greases, etc.; $1,500,000. Representative: United States Corporation Co., Dover.

COTTON STATES OIL CO., Hattiesburg, Miss.; refined oil products; $150,000. Incorporators: R. D. Moore and J. G. Donald, both of Hattiesburg.

LANAIR CO., INC., 2639 North Racine Ave., Chicago, Ill.; chemical compounds etc.; $20,000. Incorporators: C. H. and J. A. Millner and A. D. Heffron, Jr.

NATIONAL CARBON CO., INC. Wilmington, Del.; carbon products; $5,000,000. Representative: Corporation Service Co., Equitable Bldg., Wilmington.

INDIAN OIL CO., Charleston, W. Va.; refined oil products; $100,000. Incorporators: H. D. Lively and J. T. Nolan, Ward, W. Va. The last noted is representative.

PRO-PHY-LENE CHEMICAL CO., Wilmington, Del.; disinfectants and chemical compounds; $200,000. Representative: Delaware Registration Trust Co., 900 Market St., Wilmington.

ACME CARBON MFG. CORP., Monroe, La.; carbon black, etc.; $250,000. Incorporators: W. E. Allen, L. M. Larche, and H. D. Montgomery, all of Monroe.

THE BENNETT BRASS CO., Greenville, Mich.; brass products; $150,000. Incorporators: E. C. Mangold, Willard J. Bennett, Manufacturers' Bldg., Grand Rapids. The last noted is representative.

ALUMINUM CO. OF MICHIGAN, INC., Pittsburgh, Pa.; aluminum and other metals; $100,000. Incorporators: F. B. Ingersoll, Miles H. England and G. R. Gibbons, 2400 H. W. Oliver Bldg., Pittsburgh.

W. J. EARLY SONS' FOUNDRY CORP., Wilmington, Del.; steel, iron and other metal castings; $2,100,000. Representative: The American Guarantee & Trust Co., Wilmington.

Industrial Notes

THE NORTON CO., Worcester, Mass., manufacturer of abrasive materials, has arranged with the Northeastern University, Boston, to give employment to at least 20 students from Worcester and vicinity, taking a mechanical engineering course at the institution on a half-time basis, to permit of such employment.

CHARLES N. MCNAIR, Paterson, N. J., receiver for the Union Wax & Parchment Paper Co., Hamburg, N. J., has been authorized by the Federal Court to offer the property of the company at a public sale on Aug. 30. The receivership has been operative since Feb. 15, 1922. The plant is said to be the largest of its kind in this country, and is appraised at about $800,000.

THE DIXIE CONSOLIDATED GRAPHITE CO., Birmingham, Ala., has called a special meeting of stockholders on Aug. 7, to arrange for an increase in capital to $1,500 000, a portion of the proceeds to be used for expansion. W. L. Shumate, Jr., is president.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

ACID PHOSPHATE. St. Stephens, Canada. Purchase.—7327.

ALCOHOL. Damascus, Syria. Agency.—7336.

CARBON BLACK, best quality. Basel, Switzerland. Purchase and agency.—7313.

CHEMICALS. Teheran, Persia. Agency.—7302.

CHEMICALS. Damascus, Syria. Agency.—7336.

DYES and COLORS. Turin, Italy. Agency.—7310.

GLUE. Riga, Latvia. Agency.—7305.

PERFUMERY. Lucca, Italy. Agency.—7300.

ROSIN. Riga, Latvia. Agency.—7305.

ROSIN. Turin, Italy. Agency.—7310.

SODA, CAUSTIC and CARBONATE. Turin, Italy. Agency.—7310.

SODA, NITRATD. St. Stephens, Canada. Purchase.—7315.

SULPHATE of AMMONIA. Teneriffe, Canary Islands. Agency.—7342.

STARCH, in 50-lb. boxes. Alexandria,